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ABSTRACT

This publication is an annotated bibliography of technical books and monographs sponsored by the Energy Research and Development Administration (ERDA) and its predecessor agencies. These entries have been published by commercial publishers, nonprofit institutions and organizations, and the federal government. The books and monographs are grouped under 13 subject categories and provide complete bibliographic and order information. Recent published symposiums from ERDA projects and recent and relevant bibliographies appear in special sections at the end of each subject category. Author, series, and title indexes are also included. (Author/MA)

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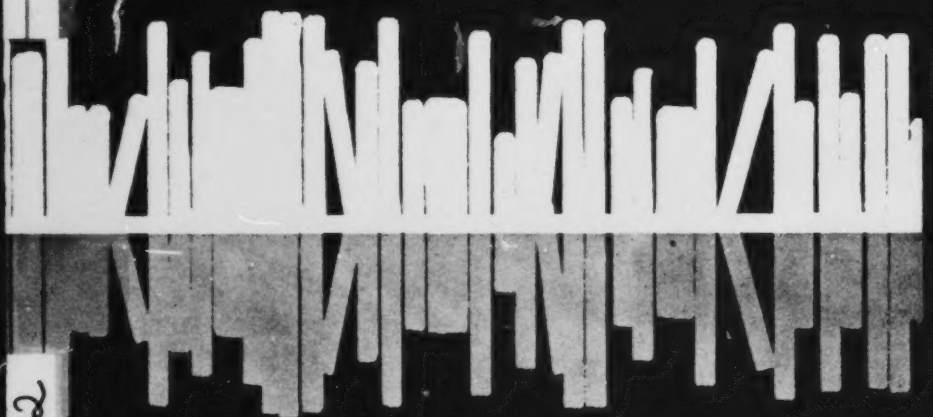
1977 Catalog



Energy Research and Development Administration

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First printing

Foreword

To help meet the information needs of scientists and engineers working in energy-related fields, the Energy Research and Development Administration (ERDA) supports an extensive technical information program. This information program, a vital link between ERDA's programs and the scientific community, provides access to a large body of knowledge generated by many programs—programs as diverse as the field of nuclear medicine, the exploration of physical mechanisms at work in the environment, and the varied technologies required to realize the potential of all energy sources. The ERDA Office of Technical Information plays a leading role in building this important communication link by identifying areas needing published information and by arranging through the programmatic groups for the writing and publishing of technical books, monographs, symposium proceedings, critical reviews, and journals to fill the need.

Technical Books and Monographs lists many of the technical books made available through the technical information programs, both of the groups that were brought together to form ERDA and of the current ERDA information effort. It is our hope that these books and monographs will contribute significantly to ERDA's goal of developing energy sources to meet the needs of present and future generations.

Office of Technical Information
Energy Research and Development Administration

To the Reader

Technical Books and Monographs is a bibliography of books and monographs sponsored by the Energy Research and Development Administration (ERDA) and by the organizations brought together to form ERDA under the Energy Reorganization Act of 1974. In general, information for each published book, and for each book in press when known, includes title; author and author affiliation; publisher and publication date; page count; size of book; price; availability information if the book is not available from the publisher; Library of Congress card number (LC), with CIP to indicate books that have cataloging information in the publication; International Standard Book Number (ISBN); a brief descriptive statement concerning the book; and for the more recent books a list or a description of the contents.

The books and monographs are grouped under thirteen subject categories. Recent published symposiums from ERDA projects and recent and relevant bibliographies appear in special sections at the end of each subject category. Also, at the end of the catalog are described the following ERDA publications: *ERDA Energy Research Abstracts, Energy Abstracts for Policy Analysis, Solar Energy Update, Fossil Energy Update, Nuclear Safety,* and *Power Reactor Docket Information.*

AVAILABILITY INFORMATION

Publishers and Sales Agencies

The books listed in this catalog are available from the publisher; from the National Technical Information Service (NTIS); from the Superintendent of Documents, Government Printing Office (GPO); or from a firm that provides out-of-print books. The names and addresses of the publishers and sales agencies are listed on pages 117 and 118.

Publications at NTIS

Microfiche designates 4- by 6-in. sheets of film. Before October 1974 the reduction ratio in the image area was 18 to 1; since that time a reduction ratio of 24 to 1 has been used. *Microfilm* refers to a roll of positive 35-mm film. *Paper copy* is used to describe printed copy or copy enlarged from microfiche. Price includes postage for orders in the United States and continental North America. For other countries the price for paper copy is double the listed price, and the price for microfiche is $4.50.

For catalog entries citing the price schedule on page iii, the price for microfiche is $3.00, and the price for paper copy is as follows:

Page range	Price	Page range	Price
1–25	$ 3.50	376–400	$10.75
26–50	4.00	401–425	11.00
51–75	4.50	426–450	11.75
76–100	5.00	451–475	12.00
101–125	5.50	476–500	12.50
126–150	6.00	501–525	12.75
151–175	6.75	526–550	13.00
176–200	7.50	551–575	13.50
201–225	7.75	576–600	13.75
226–250	8.00	601–700	16.25
251–275	9.00	701–800	18.75
276–300	9.25	801–900	21.25
301–325	9.75	901–1000	23.75
326–350	10.00	1001–1100	28.25
351–375	10.50	1101–1200	32.75

Publications at GPO

Prices given for GPO include handling charges and postage to addresses within the United States and its possessions. For foreign orders the surcharge is one-fourth the cost of the publication or subscription.

Publications at University Microfilms International

Out-of-print books placed at University Microfilms International are available in either of two forms: *xerographic copy* (library binding available) or *microfilm*, a roll of positive 35-mm film. Orders should include the OP, PB, or CD number of the publication, as well as the title. The library binding is $3.00 extra for every 600 pages. The listed prices apply within the United States. The prices for orders from Canada and Mexico are 10% higher; the prices for other countries are 15% higher.

SERIES PUBLICATIONS

Many publications in this booklet are part of various series that were begun under the Atomic Energy Commission (AEC) and have been continued under ERDA. These series are identified by series titles in parentheses below their respective book titles. The different series are briefly described here.

ERDA Critical Review Series

This series is designed to present discussions on the state of the art in specific and limited fields of interest, identifying significant developments, both published and unpublished, and synthesizing new concepts out of the contributions of many. ERDA regards this series as an important means to counteract the effects of the information explosion facing scientists today.

ERDA Symposium Series

This series is reserved for the more significant ERDA-sponsored symposiums that are not of broad enough interest to be published commercially and yet have long-range potential use.

Monograph Series

Several monograph series are written on subjects important in the field of energy. The societies that prepared these monographs include the American Chemical Society, American Industrial Hygiene Association, American Institute of Biological Sciences, American Nuclear Society, and American Society for Metals.

National Nuclear Energy Series

The volumes in this series were written by scientists who performed research and development work on the atomic energy enterprise under the Manhattan Engineer District and later under the AEC.

The out-of-print unclassified volumes in this series are available from University Microfilms International (see the discussion on page iii under this name) or from Microforms International Marketing Company.

Microforms International Marketing Company, division of Pergamon Press, Inc., offers the volumes in 16-mm microfilm. Orders will be supplied in negative microfilm unless positive film is specified. Cartridges will be provided at a cost of $2.00 per reel (specify 3M or Kodak). Jackets are available at an additional 40% of the open-reel price. The set of 64 volumes is available on 16-mm microfilm at the following prices: $590.00 for microfilm on open reel, $628.00 in cartridges, and $826.00 in jackets.

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CREDITS FOR PHOTOGRAPHS

Applied Physics Laboratory: 1 (T)

Argonne National Laboratory: 22 (B), 35 (M), 89 (M), 101 (B)

Atomics International: 76 (B)

Battelle, Pacific Northwest Laboratories: 54 (B), 115 (B)

Brookhaven National Laboratory: 1 (M), 54 (T)

Environmental Protection Agency: 6 (B)

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Los Alamos Scientific Laboratory: 42 (M), 89 (T)

Oak Ridge National Laboratory: 6 (T), 6 (M), 22 (T), 35 (T), 47 (M), 47 (B), 54 (M), 68 (M), 74 (T), 74 (M), 101 (M), 115 (T), 115 (M)

Portland General Electric Company: 101 (T)

Sandia Corporation: 89 (B)

University of Rochester: 68 (B)

GENERAL REFERENCE

The Atomic Energy Deskbook

John F. Hogerton, consultant to Arthur D. Little, Inc.
Reinhold Publishing Corp., 1963. 673 pp., 7 by 10, $16.50.
LC 63-13445 ISBN 0-442-15330-9

A one-volume encyclopedia prepared for engineers and scientists unfamiliar with atomic energy, as well as for those who are specialists in certain areas of this field. It is designed to be of equal value as a reference work for management, teachers, students, writers, and interested laymen in general. Entries, arranged alphabetically, range from a simple explanation to a treatment in depth.

Atomic Energy for Military Purposes: The Official Report on the Development of the Atomic Bomb Under the Auspices of the United States Government, 1940–1945

Henry DeWolf Smyth, Princeton University, consultant to Manhattan District, U. S. Engineers
Princeton University Press, 1945. 308 pp., 5 by 8. Available from University Microfilms as CD568. Xerographic copy, paper binding, $32.40. Microfilm, $10.80.

The story of the development of the atomic bomb by the combined efforts of many groups in the United States. Written originally as a report, this publication describes the scientific and technical developments in this country from 1940 to 1945 directed toward the military use of energy from atomic nuclei. Though not written as a popular account of the subject, this report is intended to be intelligible to scientists and engineers generally and to other college graduates with a good grounding in physics and chemistry.

Atomic Shield, 1947/1952

(Volume II of A History of the United States Atomic Energy Commission)
Richard G. Hewlett and Francis Duncan, U. S. Atomic Energy Commission
Pennsylvania State University Press, 1969. 718 pp., 7 by 10. Available from NTIS as WASH-1215. Paper copy, $9.00. Microfiche, $3.00.
LC 62-14633

A history covering the years when, simultaneously, the newly formed Atomic Energy Commission was turning from a wartime to a peacetime organization under David E. Lilienthal, charges of subversion were being made against one of the key figures in the Manhattan Project, J. Robert Oppenheimer, and Congress and the Commission struggled with the implications of the Soviet detonation in 1949 and the possibility of development of thermonuclear weapons.

Atoms for the World

Laura Fermi, historian for the U. S. Delegation to the 1955 Geneva Conference
University of Chicago Press, 1955. 227 pp., 6 by 9, $10.00.
LC 57-6977 ISBN 0-226-24370-2

An intimate and informative account for the layman, illuminating the hopes and plans of the participants, the problems encountered, the people involved, and the successful culmination of months of planning and work entailed in U. S. participation in the Geneva Conference.

Education and the Atom

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1964, presentation volume)
Glenn T. Seaborg, U. S. Atomic Energy Commission, and Daniel M. Wilkes, University of California
McGraw-Hill, 1964. 150 pp., 9 by 9. Available from University Microfilms as OP24895. Xerographic copy, paper binding, $19.00. Microfilm, $6.40.
LC 64-23183

An analysis of the special problems of education, training, and dissemination of information resulting from scientific developments, combined with a description of programs developed by the AEC to cope with these problems.

The Effects of Nuclear Weapons

(Revised edition)
Editor: Samuel Glasstone, consultant to the U. S. Atomic Energy Commission
U. S. Government Printing Office, in press. Estimated date of publication: winter 1976–1977.

A new edition of a standard reference work prepared by the Defense Nuclear Agency, Department of Defense, at the request of the U. S. Atomic Energy Commission. It updates information published in the 1962 edition and includes data on radiological, blast, thermal, radioblackout, and electromagnetic-pulse effects of nuclear detonations.
CONTENTS: General principles of nuclear explosions. Descriptions of nuclear explosions. Air-blast phenomena in air and surface bursts. Air-blast loading. Structural damage from air blasts. Effects of surface and subsurface bursts. Thermal radiation and its effects. Initial nuclear radiation. Residual nuclear radiation and fallout. Radio and radar effects. The electromagnetic pulse and its effects. Biological effects. Index.

Introduction to Nuclear Science

Alvin Glassner, Argonne National Laboratory
D. Van Nostrand Co., 1961. 213 pp., 6 by 9. Available from University Microfilms as OP64218. Xerographic copy, paper binding, $25.50. Microfilm, $8.50.
LC 60-53494

An outgrowth of an intensive course for high-school teachers developed by a committee of the Argonne National Laboratory Branch of the Scientific Research Society of America. Included are a brief review of atomic structure, discussion of detection methods and the known forms of radiation, description of the nucleus and nuclear reactions, survey of accelerators and reactors, and applications of nuclear science in chemistry and biology. The book is basic in content to narrow the gap between the training of the average high-school teacher and the state of scientific knowledge. Translated into Spanish.

Management of Nuclear Materials

Editor: Ralph F. Lumb, Western New York Nuclear Research Center, University of Buffalo (New York)
D. Van Nostrand Co., 1960. 515 pp., 6 by 9. Available from University Microfilms as OP67408. Xerographic copy, paper binding, $59.80. Microfilm, $20.00.
LC 60-15812

A source book that describes and discusses the acquiring, recording, evaluating, and presenting of quantity data necessary for the control of nuclear materials in all operations from mine to reactor. Specialists in various subject areas discuss control systems, accounting and inventory procedures, measuring techniques, and statistical methods.

The New World, 1939/1946

(Volume I of A History of the United States Atomic Energy Commission)

Richard G. Hewlett and Oscar E. Anderson, Jr., Office of the Secretary, U. S. Atomic Energy Commission

Pennsylvania State University Press, 1962. 766 pp., 7 by 10. Available from NTIS as WASH-1214. Paper copy, $9.00. Microfiche, $3.00.
LC 62-14633

A history presenting the administrative and technical achievements of the Manhattan Project, the formulation of national and international policy on atomic energy, and the legislative origins of the U. S. Atomic Energy Commission on a level understandable to the layman but still informative to the technical man.

Nuclear Research, U.S.A.

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1964, presentation volume)

Albert V. Crewe and Joseph J. Katz, Argonne National Laboratory

Dover Publications, 1969 (facsimile of McGraw-Hill 1964 edition of *Research, U.S.A.*). 217 pp., 9 by 9, $2.95.
LC 64-23180 ISBN 0-486-62295-9

A selective account of U. S. progress in basic research related to atomic energy since the 1958 international conference in Geneva.

Quality Systems in the Nuclear Industry and in Other High Technology Industries

B. W. Marguglio, Aerojet Nuclear Company

American Society for Testing and Materials, in press. Estimated date of publication: winter 1976–1977.

A book written in the total quality concept. It is organized by project phases: design, procurement, and fabrication. In-depth detail of the design, the logic, and the universal features of each quality system is presented. The universal systems are exemplified with cases from the nuclear, aeronautics, electronics, and space industries. Information is provided for application of systems to the reader's own industry. No detailed material on mathematical or applied statistics is included.

CONTENTS: Meanings, goals and scope of quality. The systems approach. The product evolution cycle. Requirements documents. Design requirements. Tolerancing. Cause and effects analysis. Consequence analysis. Component/part application analysis. Maintenance task. Design review. Quality requirements for supplies. Source selection. Measurement control. Component qualification. Design change control. Acceptance sampling. Inspection/test planning and process control. Control of nonconforming items. Product liability and consumer product safety. Quality information feedback and corrective action. Auditing quality systems and inspection effectiveness. Industrial psychology in quality control. Economics of quality.

Radiation Monitoring: A Programmed Instruction Book

James E. Wade and G. E. Cunningham, General Electric Company

U. S. Atomic Energy Commission, 1967. 286 pp., 6 by 9. Available from Energy Research and Development Administration, Technical Information Center, as EDM-123, $3.70; for 25 or more copies, $2.50 each.

A program of self-instruction on radiation monitoring. The objective of the programmed instruction in this book is to provide the reader with sufficient knowledge of the fundamentals of the subject to enable him to perform radiation monitoring duties effectively under appropriate supervision. The program is so designed that it can be used by those who know the subject but wish to review fundamentals and by those who need an introduction to radiation monitoring or a less theoretical study of the uses of monitoring instruments. This book is composed of the program proper, a supplement, and a final test.

Radioactivity and Radiation Detection

Dudley G. Miller, Knolls Atomic Power Laboratory

Gordon and Breach, 1972. 121 pp., 6 by 9, $19.50.
LC 70-146446 ISBN 0-677-0149-2

A summary of the practical and theoretical information necessary to an understanding of radioactivity and the intelligent application of radiation detectors. This book is designed primarily as a text for undergraduates. It will also be of use to short-course students studying radioactivity and detection systems and, as a source of reference, to workers in many areas of radioactivity who are seeking quick definitions of terms and basic concepts. CONTENTS: Five main subject areas: Radioactive decay. Interaction of radiation with matter. Detection of radiation. Quantitative measurement of radiation. The literature of radiation detection. Appendix. Index.

Radioisotopes and Radiation

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1964, presentation volume)

John Lawrence, University of California, Bernard Manowitz, Brookhaven National Laboratory, and Benjamin S. Loeb, U. S. Atomic Energy Commission

Dover Publications, 1969 (facsimile of McGraw-Hill 1964 edition). 133 pp., 9 by 9, $3.00.

LC 69-20423 ISBN 0-486-62296-7

A selective presentation of U. S. progress in applying radioisotopes and radiation to medicine, agriculture, and industry.

Reflections on Big Science

Alvin M. Weinberg, Oak Ridge National Laboratory

MIT Press, 1967. 182 pp., 5 by 8. Library binding, $10.00. Paper binding, $2.95.

LC 67-14205 ISBN 0-262-73018-9

A loosely coherent collection of talks and essays which discuss the relation of modern science and modern society. The talks, comprising roughly half the book, assert that mission-oriented laboratories and the work they do are indispensable to the society which supports them. The essays, constituting the other half, reflect the author's efforts over many years to independently consider the troublesome questions of the new style of Big Science.

Sourcebook on Atomic Energy

(Third edition)

Samuel Glasstone, consultant to the U. S. Atomic Energy Commission

D. Van Nostrand Co., 1967. 883 pp., 6 by 9, $16.95.

LC 67-29947 ISBN 0-442-02704-4

A source of basic atomic-energy information for readers with varied interests. Translated into Greek, Croatian-Serbian, Polish, Spanish, Korean, Arabic, Turkish, and German.

The Stanford Two-Mile Linear Accelerator

Editor: R. B. Neal, Stanford University

W. A. Benjamin, Inc., 1968. 1169 pp., 7 by 9. Available from Addison-Wesley, $45.00.

LC 68-24364 ISBN 0-8053-7240-7

A detailed discussion of documenting the design and construction of the two-mile electron linear accelerator located at Stanford University. The design solutions are of general interest to a broad group of accelerator designers, builders, and users. The technical material is also of interest to engineers and students working with high-power pulse techniques and special fabrication problems. The principal subject matter covered includes the site, the buildings and utilities, and the components and systems of the accelerator and the beam switchyard. The associated physics research equipment and the research program have been briefly described to complete the overall view. The descriptions and results apply to the status in July 1967. References are given at the end of each chapter.

Table of Isotopes

(Sixth edition)

C. M. Lederer, Jack M. Hollander, and I. Perlman, Lawrence Radiation Laboratory

John Wiley & Sons, 1967. 594 pp., 8 by 11. Library binding, $12.25. Paper binding, $8.25.

LC 67-24402 ISBN 0-471-52115-9 (library binding)

ISBN 0-471-52116-7 (paper binding)

A portable handbook that is selective and critical rather than encyclopedic. This edition with its markedly altered format is divided into Table I, a ready reference of stable and unstable species arranged serially according to element or atomic number, and Table II, a more detailed arrangement of decay-scheme and energy-level diagrams.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

AESOP Conference, Proceedings
Volume 13
Chicago, Ill. Oct. 22–24, 1975. Sponsored by Energy Research and Development Administration. 1975. 383 pp. Available from NTIS as CONF-751011.

Experimental Methods for Charged-Particle Irradiations, Symposium on
Gatlinburg, Tenn. Sept. 30, 1975. Sponsored by American Society for Testing Materials and Energy Research and Development Administration. 1975. 100 pp. Available from NTIS as CONF-750947.

High Energy Accelerators, Ninth International Conference on
Stanford, Calif. May 2, 1974. Sponsored by International Union of Pure and Applied Physics. 1974. 786 pp. Available from NTIS as CONF-740522.

Seventh Alternative Automotive Power Systems Division Contractors Coordination Meeting
Ann Arbor, Mich. May 13, 1974. Sponsored by Environmental Protection Agency, Alternative Automotive Power Division. 1974. 371 pp. Available from NTIS as CONF-740543.

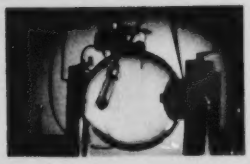
Training of Nuclear Facility Personnel, Second ANS Symposium on
Gatlinburg, Tenn. May 11, 1975. Sponsored by Oak Ridge National Laboratory and American Nuclear Society. 1975. 347 pp. Available from NTIS as CONF-750515.

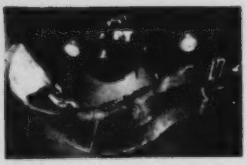
RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Civil, Industrial, and Scientific Uses for Nuclear Explosions, Selected, Annotated Bibliography of the
USAEC Technical Information Center. April 1974. 125 pp. Available from NTIS as TID-3522-R9-S2.
ERDA Technical Information Center. July 1975. 69 pp. Available from NTIS as TID-3522-R9-S3.

Standards in Nuclear Science and Technology
USAEC Technical Information Center. September 1973. 239 pp. Available from NTIS as TID-3336.





BIOLOGY AND MEDICINE

Animal Tissue Techniques

(Third edition)

Gretchen L. Humason, Oak Ridge Associated Universities
W. H. Freeman and Co., 1972. 641 pp., 6 by 9, $16.00.
LC 77-172241 ISBN 0-7167-0692-X

A text and laboratory handbook that introduces the basic techniques for working with animal tissues. The author provides both a guide to elementary histological procedures and an introduction to more-specialized techniques. The emphasis is on practical instruction in preparing specimens for microscopic analysis. The text anticipates and offers solutions to many of the typical laboratory problems. A new feature in this edition is the discussion of methods for preparing and staining "plastic" sections for light microscopy. Students and instructors in courses on histotechnique and microtechnique and in the laboratory portions of undergraduate histology courses will find this book to be useful.

CONTENTS: Four main subject areas: Basic procedures (12 chapters). Specific staining methods (11 chapters). Histochemistry and miscellaneous special procedures (4 chapters). Solution preparation and general laboratory aids (2 chapters). References. Index.

Atlas of the Domestic Turkey (Meleagris gallopavo): Myology and Osteology

E. B. Harvey, U. S. Atomic Energy Commission, H. E. Kaiser, School of Medicine, The George Washington University, and R. E. Rosenberg, University of California
U. S. Atomic Energy Commission, 1968. 255 pp., 8 by 10. Available from NTIS as WASH-1123. Price schedule on page iii.
LC 68-62209

An atlas designed to bring into one publication labeled drawings of the muscles and bones of the domestic turkey, an important member of the gallinaceous birds. Included is a table of bird muscle synonomies that should be useful to the student of bird anatomy. This book provides an inexpensive working copy to which additions and corrections can easily be made.

An Atlas of Radiation Histopathology

David C. White, Armed Forces Institute of Pathology
Energy Research and Development Administration, 1975. 236 pp., 9 by 11.
Available from NTIS as TID-26676. Paper copy, $7.60. Microfiche, $3.00.
LC 75-17867 (CIP)

A compendium of the more commonly encountered sequential histopathologic effects of therapeutic irradiation. The scope of the atlas is limited to the commonly accepted fundamental interactions of ionizing radiation and organized tissue, and the presentation focuses on the progressive radiation-related functional and structural changes which are potentially debilitative to the exposed individual. The book provides a rapid visual reference for radiation pathology augmented by a brief presentation of the basic mechanisms of early and delayed tissue effects.
CONTENTS: Acute whole-body irradiation. Skin. Heart. Lung. Mouth, pharynx, and salivary glands. Esophagus and stomach. Intestines. Liver and pancreas. Kidney. Urinary bladder, and prostate. Uterus and vagina. Brain and spinal cord.

An Atlas of RF Mouse Pathology: Disease Descriptions and Incidences

N. K. Clapp, Oak Ridge National Laboratory
U. S. Atomic Energy Commission, 1973. 125 pp., 9 by 11. Available from NTIS as TID-26373. Paper copy, $5.45. Microfiche, $3.00.
LC 73-600220
A compilation of disease information on female RF mice. The data were obtained from over 3000 RF female mice with complete necropsies and 80% histological examination. Complementing the text are more than 200 photomicrographs depicting the pathology of the diseases covered. The book is of value to experienced pathologists and to investigators and students seeking knowledge of mouse pathology.
CONTENTS: Introduction. Animal selection, care, and observation. Necropsy procedure. Pathology: neoplastic diseases, nonneoplastic diseases, and metabolic and degenerative diseases. Disease incidences. Summary. References.

Atomic Energy Encyclopedia in the Life Sciences

Editor and major contributor: Charles Wesley Shilling, consultant to the U. S. Atomic Energy Commission
W. B. Saunders Co., 1964. 474 pp., 7 by 10. Available from University Microfilms as OP67854. Xerographic copy, paper binding, $57.00. Microfilm, $19.00.
LC 64-10656
A one-volume source book that combines the features of a dictionary and an encyclopedia. It is developed for the life scientist, the generalist or the specialist, in specific areas of this discipline. The source book is designed to be of value for the medical and biological professions as a quick reference work for researchers, teachers, administrators, students, and interested laymen. Entries, arranged alphabetically, vary from concise answers to journal length articles.

The Beagle as an Experimental Dog

Editor: Allen C. Andersen, University of California
Iowa State University Press, 1970. 616 pp., 7 by 10. $19.50.
LC 79-83321 ISBN 0-8138-016-9
A compendium of basic knowledge of the beagle that should be valuable to researchers and establish this animal as an excellent experimental dog.

Behavioral Toxicology

Editors: Bernard Weiss and Victor G. Laties, Department of Radiation Biology and Biophysics, School of Medicine and Dentistry, University of Rochester
Plenum, 1975. 469 pp., 6 by 9. $39.50.
LC 74-23919 (CIP) ISBN 0-306-36305-4
Proceedings of the Fifth Rochester International Conference on Environmental Toxicity, held at Rochester, N. Y., June 1972. Scientists with interests in a wide variety of problem areas examine such topics as prenatal exposure of mice to methylmercury, effects of carbon monoxide on both humans and lower animals, effects of pesticides on behavior, and the ototoxicity of antibiotics. Volume 5 in the Environmental Science Research Series.
CONTENTS: Papers dealing with the effects of environmental pollutants and drugs on behavior and performance (17 papers). Author and subject indexes.

Biological Effects of External Beta Radiation

(National Nuclear Energy Series, Division IV, Volume 22E)

Editor: Raymond E. Zirkle, Institute of Radiobiology and Biophysics, University of Chicago

McGraw-Hill, 1951. 242 pp., 6 by 9. Available from University Microfilms as OP6224:
Xerographic copy, paper binding, $30.60. Microfilm (35 mm), $10.20.
Also available from Microforms International: Microfilm (16 mm), $10.00.

A report on the findings of an intensive radiobiological program carried out during World War II at the Clinton Laboratories.

Biological Effects of External Radiation

(National Nuclear Energy Series, Division VI, Volume 2)

Editor: Henry A. Blair, School of Medicine and Dentistry, University of Rochester

Hafner Press, 1967 (facsimile of McGraw-Hill 1954 edition). 508 pp., 6 by 9, $17.95.
ISBN 02-841430-6

A book that deals with the biological effects of X irradiation and the chronic effects of neutron irradiation.

Biological Effects of External X and Gamma Radiation

(National Nuclear Energy Series, Division IV, Volumes 22B and 22C)

Editor: Raymond E. Zirkle, Institute of Radiobiology and Biophysics, University of Chicago

Part I

McGraw-Hill, 1954. 530 pp., 6 by 9. Available from University Microfilms as
OP6225 P1: Xerographic copy, paper binding, $63.40. Microfilm (35 mm), $21.20.

Part II

U. S. Atomic Energy Commission, 1956. 487 pp., 6 by 9. Available from NTIS as
TID-5220: Price schedule on page iii.

Also available from Microforms International: Microfilm (16 mm), $35.00 per set of two volumes.

Reports on the findings of the radiobiological program carried on during World War II at the Metallurgical Laboratory and the Clinton Laboratories.

Biological Studies with Polonium, Radium, and Plutonium

(National Nuclear Energy Series, Division VI, Volume 3)

Editor: Robert M. Fink, University of California at Los Angeles

McGraw-Hill, 1950. 411 pp., 6 by 9. Available from University Microfilms as OP13865 ED1:
Xerographic copy, paper binding, $48.70. Microfilm (35 mm), $16.30.
Also available from Microforms International: Microfilm (16 mm), $14.50.

A book that deals with the distribution and excretion of polonium and radium, as well as with the comparative toxicities of polonium, plutonium, and radium.

Biomedical Implications of Radiostrontium Exposure

(AEC Symposium Series)

Editors: Marvin Goldman and Leo K. Bustad, Radiobiology Laboratory, University of California

U. S. Atomic Energy Commission, 1972. 411 pp., 6 by 9. Available from NTIS as CONF-710201. Paper copy, $6.00. Microfiche, $3.00.
LC 72-600049

Proceedings of a symposium held in Davis, Calif., Feb. 22–24, 1971. This symposium summarizes and evaluates the knowledge of possible hazards of radiostrontium in animals and man. Participants from the United States and abroad included biomathematicians, biologists, chemists, pathologists, physicians, and physicists, providing an unusual opportunity for investigators in a variety of disciplines to exchange ideas and information. The papers and open discussions deal with information on both fundamental processes and practical applications to give insight into the interaction of radiostrontium and biologic systems. Subjects range from the global to the cellular and from examination of data on the

effects of radiation to consideration of the mechanisms by which the effects are induced. An effort is made to extrapolate available data and to reach a reasonable estimate of radiation risk in man. The salient features of the contributions are incorporated in a synthesis at the front of the book.
CONTENTS: Four main subject areas: Radiostrontium availability and metabolism (6 papers). Dosimetry of radiostrontium (3 papers). Effects of radiostrontium exposure (11 papers). Evaluation of risk (3 papers). Paper discussions. Summary discussion. Index.

The Cell Cycle in Malignancy and Immunity

(ERDA Symposium Series)

Chairman: James C. Hampton, Battelle, Pacific Northwest Laboratories
Energy Research and Development Administration, 1975. 614 pp., 6 by 9.
Available from NTIS as CONF-731005. Paper copy, $13.60. Microfiche, $3.00.
LC 74-600181

Proceedings of the Thirteenth Annual Hanford Biology Symposium, Richland, Wash., Oct. 1–3, 1973, sponsored by the Pacific Northwest Laboratories and the U. S. Atomic Energy Commission. This symposium examines in detail the proliferative cycle of cells in normal and malignant cells and in the lymphoid system with respect to immunity. The scope of papers includes the use of radiation and chemotherapeutic agents in treating cancer and in modifying the immune response.
CONTENTS: Papers dealing with the biochemistry of the cell cycle, regulation of the cell cycle, perturbations of cellular kinetics by physical and chemical agents, the cell cycle in malignancies and normal tissues, cell cycle analysis in tumor therapy, and the cell cycle in lymphoid tissues (37 papers). Index.

Clinical Radiation Pathology

(In two volumes)

Philip Rubin and George W. Casarett, University of Rochester School of Medicine
W. B. Saunders Co., 1968. 1067 pp., 7 by 10, $45.00 per set of two volumes.
LC 67-17453

A monograph that examines the problems of radiation therapy for various radiobiologic viewpoints. The authors offer and consistently apply in their interpretations the theories, concepts, and schemes of relative radiosensitivity and of direct and indirect mechanisms of radiation damage of cells, tissues, organs, and systems in vivo which appear to be highly compatible with the clinical and experimental evidence and which permit reasonable prediction of radiopathologic damage. In each chapter the therapeutic implications based on radiation pathology are analyzed, and there is an attempt to crystallize subliminal factors in their philosophy of treatment in radiation therapy. This work contains a series of paradigmatic diagrams charting the clinicopathologic course in each organ or system in terms of progressive subclinical and clinical events and processes relating to injury from radiation, from other complications, and from changes occurring with increasing age.

Clinical Uses of Radionuclides: Critical Comparison with Other Techniques

(AEC Symposium Series)

Editors: Francis A. Goswitz and Gould A. Andrews, Oak Ridge Associated Universities, and Manuel Viamonte, University of Miami. Technical Editor: Marion H. Garber, Oak Ridge Associated Universities
U. S. Atomic Energy Commission, 1972. 718 pp., 6 by 9. Available from NTIS as CONF-711101. Paper copy, $13.60. Microfiche, $3.00.
LC 72-6000271

Proceedings of a symposium held at Oak Ridge Associated Universities, Nov. 15–19, 1971, sponsored by the American College of Physicians and the USAEC Division of Biomedical and Environmental Research. This book is a representative cross section of diagnostic techniques that are of proven value in radiology, nuclear medicine, and, in some instances, clinical pathology. Only enough technical detail is included to allow the reader an appreciation of the complexity and potential for error inherent in the tests. The primary emphasis is on the practical usefulness of the techniques in clinical practice. An effort has been made to evaluate the costs, potential risks, and side effects in relation to the value of the information obtained.

CONTENTS: Nine main subject areas: Brain (4 papers). Bone and joint (5 papers). Liver and pancreas (4 papers). Blood, marrow, nodes, and spleen (4 papers). Endocrines (4 papers). Kidney (4 papers). Lung (4 papers). Heart (4 papers). General (3 papers). Nine discussions. Index.

Compartments, Pools, and Spaces in Medical Physiology

(AEC Symposium Series)

Editors: Per-Erik E. Bergner and C. C. Lushbaugh, Oak Ridge Associated Universities.
Technical Editor: Elizabeth B. Anderson, Oak Ridge Associated Universities
U. S. Atomic Energy Commission, 1967. 521 pp., 6 by 9. Available from NTIS as CONF-661010. Paper copy, $6.00. Microfiche, $3.00.
LC 67-61865

Proceedings of a symposium held at the Oak Ridge Associated Universities, Oct. 24–27, 1966. The main desire of the symposium planning committee was to bring to the attention of all interested in the field the many brilliant advances being made in performing practical and theoretical analyses of the contents of real and imaginary bodily compartments.

Dynamic Clinical Studies with Radioisotopes

(AEC Symposium Series)

Editors: Ralph M. Kniseley, Oak Ridge Institute of Nuclear Studies, and W. Newlon Tauxe, Mayo Clinic. Technical Editor: Elizabeth B. Anderson, Oak Ridge Institute of Nuclear Studies
U. S. Atomic Energy Commission, 1964. 658 pp., 6 by 9. Available from NTIS as TID-7678. Paper copy, $6.00. Microfiche, $3.00.

Proceedings of a symposium held at the Oak Ridge Institute of Nuclear Studies, Oct. 21–25, 1963. This volume is a companion to "Progress in Medical Radioisotope Scanning" (AEC Symposium Series; TID 7673). This symposium provided investigators in the disciplines of mathematics, laboratory medicine, and technology the opportunity to express problems, findings, and philosophical approaches to mutual questions. Laboratory medicine is stressed, and kinetic studies on a wide variety of organ and biomedical systems are presented.

Effects of Metals on Cells, Subcellular Elements, and Macromolecules

Editors: Jack Maniloff, James R. Coleman, and Morton W. Miller, University of Rochester
Charles C Thomas, Publisher, 1970. 412 pp., 6 by 9, $20.50.
LC 78-115387 ISBN 0-398-01210-5

Proceedings of the Second Rochester Conference on Toxicity, June 1969. The interaction of heavy metals with the cellular populations that make up the larger organism is studied, and the subcellular structures to which the metals bind and cause their pharmacological response are investigated. The test is arranged systematically to describe the effects of metals on the biochemical components of the cells, on the membranes, and at the whole-cell level. The volume provides a source of information on the molecular basis of the action of many heavy metals, particularly for use by those studying the pharmacology of these elements.

Gas Bubble Disease

Editors: D. H. Fickeisen and M. J. Schneider, Battelle, Pacific Northwest Laboratories
Energy Research and Development Administration, 1976. 123 pp., 9 by 11.
Available from NTIS as CONF-741033. Paper copy, $6.00. Microfiche, $3.00.
LC 75-619327 (CIP)

Proceedings of a symposium held at Richland, Wash., Oct. 8–9, 1974, sponsored by Battelle, Pacific Northwest Laboratories, and the U. S. Atomic Energy Commission. This volume is the first compendium of research results from the many laboratories dealing with gas bubble disease. In addition to the formal papers, the proceedings include summaries of five informal round-table discussions devoted to the definition of research needs as related to gas bubble disease in particular topic areas.

CONTENTS: Papers covering tolerance of biota to dissolved supersaturation, physiological effects on dissolved gas supersaturation, and developments in analytical systems (18 papers).

Summaries of round-table discussions dealing with biological studies: laboratory orientation; field orientation; analytical methods; physics of dissolved gases and engineering solutions; and water quality standards. Index.

Histopathology of Irradiation from External and Internal Sources

(National Nuclear Energy Series, Division IV, Volume 22 I)

Editor: William Bloom, University of Chicago

McGraw-Hill, 1948. 808 pp., 6 by 9. Available from University Microfilms as OP16842: Xerographic copy, paper binding, $96.50. Microfilm (35 mm), $32.20. Also available from Microforms International: Microfilm (16 mm), $29.00.

A report on three years of intensive war research undertaken to compare histological changes of the body resulting from various types of radiations originating externally and internally.

Industrial Medicine on the Plutonium Project: Survey and Collected Papers

(National Nuclear Energy Series, Division IV, Volume 20)

Editor: Robert S. Stone, School of Medicine, University of California

McGraw-Hill, 1951. 511 pp., 6 by 9. Available from University Microfilms as OP13917 ED1: Xerographic copy, paper binding, $61.00. Microfilm (35 mm), $20.40. Also available from Microforms International: Microfilm (16 mm), $18.00.

A description of the problems faced by the Medical Section of the Metallurgical Laboratory at the outset of the Atomic Energy Project in determining the injuries that could result from exposure to radiation, some of the clinical tests devised, and the results of special studies.

Inhalation Carcinogenesis

(AEC Symposium Series)

Editors: M. G. Hanna, Jr., P. Nettesheim, and J. R. Gilbert, Biology Division, Oak Ridge National Laboratory

U. S. Atomic Energy Commission, 1970. 524 pp., 6 by 9. Available from NTIS as CONF-691001. Paper copy, $6.00. Microfiche, $3.00. LC 76-605835

Proceedings of a conference held in Gatlinburg, Tenn., Oct. 8–11, 1969, under the sponsorship of the National Cancer Institute and the U. S. Atomic Energy Commission. The purpose of this symposium was primarily to evaluate the importance and feasibility of using inhalation techniques to study respiratory carcinogenesis and also to determine the status of chronic inhalation studies under way. Some emphasis is given to inhalation studies, with improved techniques and procedures. The results of such studies are put in perspective within the concern of environmental influences on man.

Interaction of Radiation and Host Immune Defense Mechanisms in Malignancy

Conference Cochairmen: V. P. Bond, Brookhaven National Laboratory; S. Hellman and S. E. Order, Harvard Medical School; H. D. Suit, Massachusetts General Hospital; and H. R. Withers, University of Texas M. D. Anderson Hospital and Tumor Institute

Brookhaven National Laboratory, 1974. 411 pp., 6 by 9. Available from NTIS as BNL-50418. Paper copy, $10.60. Microfiche, $3.00.

Proceedings of a symposium held at White Sulphur Springs, W. Va., Mar. 23–27, 1974, sponsored by the Immunology and Radiation Programs of the Division of Cancer Research Resources and Centers of the National Cancer Institute. Radiobiologists, radiotherapists, and immunologists met for an interdisciplinary exchange of ideas and information.

CONTENTS: Six main subject areas: Basic immunology (4 papers). Host tumor interactions (5 papers). Basic radiation biology (3 papers). Radiation and immune defense interaction (7 papers). Prospects for immunotherapy (7 papers). Radiation and immunotherapy (3 papers). Meeting summary. Author index.

Ionizing Radiation: Neural Function and Behavior

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)

D. J. Kimeldorf and E. L. Hunt, U. S. Naval Radiological Defense Laboratory

Academic Press, 1965. 331 pp., 6 by 9, $12.50.

LC 65-26042 ISBN 0-12-406950-9

A summary of the physiological and behavioral results evident upon the irradiation of neural tissue. Primarily the monograph deals with the effects on neural integration, effector mechanisms, behavioral manifestations, sensory processes, and neural development.

Irradiation and the Nervous System

Charles D. Van Cleave, School of Medicine, University of North Carolina

Rowman and Littlefield, 1963. 431 pp., 6 by 9. Available from American Nuclear Society, $9.75.

LC 63-13402

A survey and critical evaluation of work concerning the effects of ionizing radiation on the nervous system (including work of the USSR). Written primarily for radiologists, neurologists, and radiobiologists, the book covers areas of considerable interest to neurosurgeons, neuropharmacologists, neurophysiologists, neuroanatomists, physiologists, and biochemists. Full reference coverage of Western and Soviet studies at the time on the deleterious effects of radiation on the central nervous system is included.

Late Somatic Effects of Ionizing Radiation

Charles D. Van Cleave, University of North Carolina

U. S. Atomic Energy Commission, 1968. 310 pp., 6 by 9. Available from NTIS as TID-24310. Paper copy, $6.00. Microfiche, $3.00.

LC 68-62106

A close look at some of the evidence and some of the questions concerning the late somatic effects of ionizing radiation. The discussions emphasize the nature of the early biological changes that are responsible for the eventual appearance of cancer, leukemia, and nonneoplastic late effects, particularly those which bring about life shortening.

Light: Physical and Biological Action

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)

H. H. Seliger and W. D. McElroy, The Johns Hopkins University

Academic Press, 1965. 417 pp., 6 by 9, $14.50.

LC 65-21329 ISBN 0-12-635850-8

A bridge between the diverse fields of radiant energy physics, energy-transfer mechanisms, chemiluminescence, bioluminescence, light-receptor structure, photoperiodism, photomorphogenesis, phototropism, phototaxis, photoreactivation, photoprotection, photodynamic action and vision. This monograph was written to serve as a reference for the research worker as well as an introduction to the status of photobiology and the modern molecular mechanism approach to absorption of light by biological systems.

Mammalian Cells: Probes and Problems

(ERDA Symposium Series)

Editors: C. R. Richmond, D. F. Petersen, P. F. Mullaney, and E. C. Anderson, Los Alamos Scientific Laboratory

Energy Research and Development Administration, 1975. 324 pp., 6 by 9.

Available from NTIS as CONF-731007. Paper copy, $7.60. Microfiche, $3.00.

LC 75-600009

Proceedings of the First Los Alamos Life Sciences Symposium, held at Los Alamos, N. Mex., Oct. 17–19, 1973, sponsored by the Los Alamos Scientific Laboratory, the National Cancer Institute, and the U. S. Atomic Energy Commission. Recently developed and still rapidly evolving techniques of flow microfluorometry, scanning cytophotometry, and cytographic analysis offer new tools for probing the secrets of cell behavior. In the interdisciplinary atmosphere of this conference, physicists, biologists, biophysicists, engineers, and physicians explore the validation, correlation, and application of these analytical techniques to both applied and basic biological problems and discuss how best to exploit the new methods. Topics discussed include DNA content and distribution, surface receptor sites, cell and nuclear volume, and light scattering.

CONTENTS: Five main subject areas: Image-analysis techniques (7 papers). Flow-systems cell analysis and sorting (7 papers). Cell-cycle analysis (6 papers). The cell nucleus (7 papers). The cell surface (6 papers). Index.

Mammalian Radiation Lethality: A Disturbance in Cellular Kinetics

(American Institute of Biological Sciences—U. S. Atomic Energy Commission Monograph)
V. P. Bond, T. M. Fliedner, and J. O. Archambeau, Brookhaven National Laboratory
Academic Press, 1965. 340 pp., 6 by 9, $12.50.
LC 65-23842 ISBN 0-12-114150-0

A comprehensive treatment of the short-term effects of a single exposure to large doses of ionizing radiation in the mammal. This monograph deals in detail with what is known about the pathogenesis and manifestations of radiation injury and is oriented throughout to the underlying cellular changes.

Medical Effects of the Atomic Bomb in Japan

(National Nuclear Energy Series, Division VIII, Volume 8)
Editors: Ashley W. Oughterson, School of Medicine, Yale University, and Shields Warren, New England Deaconess Hospital
McGraw-Hill, 1956. 477 pp., 6 by 9. Available from University Microfilms as OP10619: Xerographic copy, paper binding, $56.20. Microfilm (35 mm), $13.80.
Also available from Microforms International: Microfilm (16 mm), $17.00.

Results of the investigations by the Joint Commission for the Investigation of the Effects of the Atomic Bomb in Japan following the bombing of Hiroshima and Nagasaki.

Medical Radionuclides: Radiation Dose and Effects

(AEC Symposium Series)
Editors: Roger J. Cloutier and C. Lowell Edwards, Oak Ridge Associated Universities, and Walter S. Snyder, Oak Ridge National Laboratory.
Technical Editor: Elizabeth B. Anderson, Oak Ridge Associated Universities
U. S. Atomic Energy Commission, 1970. 528 pp., 6 by 9. Available from NTIS as CONF-691212. Paper copy, $6.00. Microfiche, $3.00.
LC 70-606556

Proceedings of a conference held at Oak Ridge Associated Universities, Dec. 8–11, 1969, under the sponsorship of the Environmental Control Administration, Bureau of Radiological Health, and the U. S. Atomic Energy Commission. The book deals with mathematics for calculating radiation dose from medical radionuclides; the effect of age, sex, disease, and pharmaceuticals on radiation dose; and biologic effects of radiation as related to pharmaceuticals.

Mercury, Mercurials, and Mercaptans

Editors: Morton W. Miller and Thomas W. Clarkson, Department of Radiation Biology and Biophysics, School of Medicine and Dentistry, University of Rochester
Charles C Thomas, Publisher, 1973. 386 pp., 6 by 9, $19.75.
LC 72-81709 ISBN 0-398-02600-9

Proceedings of the Fourth Rochester International Conference on Environmental Toxicity, held at Rochester, N. Y., June 17–19, 1971. The conference was designed to provide a critical analysis of what is known about the subject and what the gaps in knowledge and failings in skills may be.

CONTENTS: Five main subject areas: The general toxicity of mercury and its compounds (4 papers). Action of mercury on membranes and transport processes (4 papers). Pharmacokinetics of mercury metabolism (5 papers). Bio-complexes and chelates of mercury (4 papers). Biotransformation of mercury and organomercurials (4 papers). Author and subject indexes.

Molecular and Environmental Aspects of Mutagenesis

Editors: Louise Prakash, Fred Sherman, Morton W. Miller, Christopher W. Lawrence, and Harry W. Taber, Department of Radiation Biology and Biophysics, School of Medicine and Dentistry, University of Rochester
Charles C Thomas, Publisher, 1975. 289 pp., 6 by 9, $24.50.
LC 74-1070 (CIP) ISBN 0-398-03137-1

Proceedings of the Sixth Rochester International Conference on Environmental Toxicity, held at Rochester, N. Y., June 1973. This book contributes to an understanding of the genetic hazards to man from exposure to a wide range of pollutants. Basic interactions of environmental mutagenesis with DNA are considered first. Then the presentations and discussions progress to mutagenesis of prokaryotic and eukaryotic cells, to mutagenesis in multicellular test organisms, and finally to considerations of mutagenic phenomena in mammalian systems.
CONTENTS: Five main subject areas: An overview of chemical mutagenesis (1 paper). Action of chemical agents on DNA (2 papers). Mutagenesis in microorganisms (6 papers). Mutagenesis in mammalian systems at the cellular level (4 papers). Mutagenesis in whole animals (3 papers). Author and subject indexes.

Morphology of Experimental Respiratory Carcinogenesis

(AEC Symposium Series)
Editors: P. Nettesheim, M. G. Hanna, Jr., and J. W. Deatherage, Jr.,
Oak Ridge National Laboratory
U. S. Atomic Energy Commission, 1970. 498 pp., 6 by 9. Available from NTIS
as CONF-700501. Paper copy, $6.00. Microfiche, $3.00.
LC 73-609398
Proceedings of a symposium held at Gatlinburg, Tenn., May 13–16, 1970, sponsored by the National Cancer Institute and the U. S. Atomic Energy Commission. The animal models used in experimental respiratory carcinogenesis and the usefulness of various animal systems to provide critical information regarding the etiology and pathogenesis of human lung cancer are discussed, together with proposed classification for respiratory tract tumors in animals.

Myeloproliferative Disorders of Animals and Man

(AEC Symposium Series)
Editors: W. J. Clarke, E. B. Howard, and P. L. Hackett, Pacific Northwest Laboratory
U. S. Atomic Energy Commission, 1970. 765 pp., 6 by 9. Available from NTIS
as CONF-680529. Paper copy, $9.00. Microfiche, $3.00.
LC 70-605836
Proceedings of a symposium held in Richland, Wash., May 20–23, 1968, under the sponsorship of Battelle Memorial Institute Pacific Northwest Laboratory and the U. S. Atomic Energy Commission. Advances in the knowledge of myeloproliferative disorders are presented. Forty-two authoritative papers by scientists in various disciplines cover research in this field and indicate the path that future research must take. Fourteen pages of photomicrographs in color cover specific myeloproliferative disorders in a variety of tissues.

Pharmacology and Toxicology of Uranium Compounds

(National Nuclear Energy Series, Division VI, Volume 1)
Editors: Carl Voegtlin and Harold C. Hodge, University of Rochester
Parts I and II
McGraw-Hill, 1949. 1084 pp., 6 by 9. Available from University Microfilms as
OP13863 V1P1 for Part I and OP13863 V1P2 for Part II: Xerographic copy, paper binding: Part I, $61.80; Part II, $64.30. Microfilm (35 mm): Part I, $20.60; Part II, $21.50.
A report on the comprehensive experimental studies on uranium compounds. It includes some observations on the toxic action of fluorine and hydrogen fluoride.
Parts III and IV
McGraw-Hill, 1953. 1379 pp., 6 by 9. Available from University Microfilms
as OP13863 V1P3 for Part III and OP13863 V1P4 for Part IV:
Xerographic copy, paper binding: Part III, $84.90; Part IV, $79.20. Microfilm (35 mm): Part III, $28.30; Part IV, $26.40.
Also available from Microforms International: Microfilm (16 mm),
$87.00 per set of four volumes.
A presentation concerned chiefly with chronic inhalation toxicity of uranium compounds and the mechanism of uranium poisoning.

Physical Mechanisms in Radiation Biology

Editors: Raymond D. Cooper and Robert W. Wood, U. S. Atomic Energy Commission
U. S. Atomic Energy Commission, 1974. 332 pp., 6 by 9. Available from NTIS as CONF-721001. Paper copy, $10.60. Microfiche, $3.00.
LC 74-600124

Proceedings of a symposium held at Airlie, Va., Oct. 11–15, 1972, sponsored by the Division of Biomedical and Environmental Research, U. S. Atomic Energy Commission. Radiation biologists, radiation chemists, and biophysicists discuss the chain of events leading to the production by radiation of primary lesions in biological cells. The representatives of the different sciences pool their knowledge of initial interactions in cells and try to determine how theories in one discipline relate to those in another. The first such compilation in 20 years, the book contains reports on the kinds of research being done, extensive discussions among the specialists, and summaries of what is known and of the problems remaining.

CONTENTS: Nine main subject areas: Introduction to the biological cell (2 papers). Initial interaction mechanisms in the physical stage (1 paper). Atomic and molecular effects in the physical stage (2 papers). Early chemical events (1 paper). Energy and charge transfer (2 papers). Track structure in the chemical stage (1 paper). Radiation effects on simple biological systems (2 papers). Effects of spatial and temporal distribution of primary events (1 paper). Radiation effects on complex biological systems (4 papers). Summary. Index.

Progress in Medical Radioisotope Scanning

(AEC Symposium Series)

Editors: Ralph M. Kniseley and Gould A. Andrews, Oak Ridge Institute of Nuclear Studies, and C. Craig Harris, Oak Ridge National Laboratory. Technical Editor: Elizabeth B. Anderson, Oak Ridge Institute of Nuclear Studies
U. S. Atomic Energy Commission, 1963. 539 pp., 6 by 9. Available from NTIS as TID-7673. Available only as microfiche and copy enlarged from microfiche; price schedule on page iii.

Proceedings of a symposium held at the Oak Ridge Institute of Nuclear Studies, Oct. 22–26, 1962.

Pulmonary Deposition and Retention of Inhaled Aerosols

(American Industrial Hygiene Association–U. S. Atomic Energy Commission Monograph)

T. F. Hatch and P. Gross, Graduate School of Public Health, University of Pittsburgh
Academic Press, 1964. 192 pp., 6 by 9, $8.50.
LC 63-23200 ISBN 0-12-332350-9

A monograph that provides an understanding of the ways in which inhaled particles are handled in the respiratory system, necessary to understand health hazards from particulate air pollution, and how such diseases start. This book should be useful to industrial hygienists, health physicists, microbiologists, industrial physicians, and medical specialists in radiation health, infectious diseases, and air pollution. Over 200 references are cited.

Pulmonary Macrophage and Epithelial Cells

(ERDA Symposium Series)

Chairmen: Charles L. Sanders and Richard P. Schneider, Battelle, Pacific Northwest Laboratories
Energy Research and Development Administration, in press. Estimated date of publication: winter 1977–1978.

Proceedings of the Sixteenth Annual Hanford Biology Symposium, Richland, Wash., Sept. 27–29, 1976, sponsored by Battelle, Pacific Northwest Laboratories and Energy Research and Development Administration.

CONTENTS: Five main subject areas: Biology of pulmonary macrophages (9 papers). Biology of pulmonary endothelium and epithelium (10 papers). Isolation and culture of pulmonary cells (9 papers). The macrophage and inhaled particles (9 papers). Pathophysiology and structure (9 papers). Index.

Radiation Biochemistry

(In two volumes)

Academic Press, 1970. Both volumes 6 by 9. $53.00 per set of two volumes.

Volume I: Cells
Shigefumi Okada, University of Tokyo
366 pp., $32.50.
LC 69-18344 ISBN 0-12-054501-2
Volume II: Tissues and Body Fluids
Kurt I. Altman, University of Rochester, and Georg B. Gerber, Euratom, Centre d'Etude de l'Energie Nucleaire
396 pp., $32.50.
LC 69-18344 ISBN 0-12-054502-0
A comprehensive review of radiation biochemistry at all levels, written with the main purpose of explaining the observations at the body and tissue levels in terms of what is happening at the molecular cellular levels. The authors describe radiobiological effects in biochemical terms, elucidate the mechanisms underlying these effects, and shed light on general biological principles in living organisms. Volume I shows the interplay among radiation chemistry, radiation biochemistry, radiation biophysics, and radiobiology. Volume II deals with radiation biochemistry of mammalian organs and body fluids. Emphasis is placed on descriptions of overall biochemical changes in irradiated tissues and animals, on the dependence of these changes on cellular responses, and on the interactions among different organ systems; consideration is also given to assessing the nature, tissue, localization, and extent of radiation injury in man and animals.

Radiation Biology

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
Alison P. Casarett, New York State Veterinary College, Cornell University
Prentice-Hall, 1968. 368 pp., 6 by 9, $9.25.
LC 68-22702 ISBN 0-13-750356-3
A broad, unified coverage of the effects of ionizing radiation in the biological systems at the molecular, cellular, organ, organism, and community levels. Mammalian radiobiology receives special attention. Other topics include acute radiation effects on mammals; description and explanation for change; applied radiation biology; biological, industrial, and military applications of ionizing radiation; exposures to be expected; and present and future effects on world population.

Radiation Biology of the Fetal and Juvenile Mammal

(AEC Symposium Series)
Editors: Melvin R. Sikov and D. Dennis Mahlum, Pacific Northwest Laboratory
U. S. Atomic Energy Commission, 1969. 1026 pp., 6 by 9. Available from NTIS as CONF-690501. Paper copy, $10.00. Microfiche, $3.00.
LC 74-603748
Proceedings of the Ninth Annual Biology Symposium at Richland, Wash., May 5–8, 1969, sponsored by Pacific Northwest Laboratory and the U. S. Atomic Energy Commission. The book contains 82 papers by scientists actively studying the effects of radiation on the late prenatal and early postnatal development of mammalian systems.

Radiation Biology and Medicine: Selected Reviews in the Life Sciences

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)
Editor: Walter D. Claus, Division of Biology and Medicine, U. S. Atomic Energy Commission
Addison-Wesley, 1958. 968 pp., 6 by 9. Available from University Microfilms as OP63729. Xerographic copy, paper binding, $110.20. Microfilm, $36.80.
LC 58-12599
A review of advances in thought and research in the uses and effects of nuclear radiation in the life sciences in the United States.

Radiation and Immune Mechanisms

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
William H. Taliaferro, Lucy Graves Taliaferro, and Bernard H. Jaroslow, Argonne National Laboratory

Academic Press, 1964. 152 pp., 6 by 9, $9.50.
LC 64-20325 ISBN 0-12-682450-9
A monograph that briefly outlines the humoral and cellular phases of innate and acquired immunity and reviews in greater detail experimental work on the effects of irradiation on these mechanisms. Besides being of interest to advanced students and to scientists working in other fields, the radiation effects described may serve as an introduction to immunologists who have not worked on the radiobiological aspects of their subject.

Radiation Injury: Effects, Principles, and Perspectives

Arthur C. Upton, Oak Ridge National Laboratory
University of Chicago Press, 1969. 126 pp., 5 by 8, $7.50.
LC 69-17672 ISBN 0-226-84261-4
A broad survey and perspective of the effects of ionizing radiation of principal concern in medicine and public health, especially those effects which threaten the life of the exposed individual.

Radiation, Isotopes, and Bone

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
Franklin C. McLean and Ann M. Budy, University of Chicago
Academic Press, 1964. 216 pp., 6 by 9, $8.50.
LC 63-23199
A monograph that describes the ever increasing utilization by biologists of radiation and radioisotope techniques. Emphasizing that the importance of these new tools for studying living systems cannot be overestimated, the authors point to their application by biologists as having added significance—the new, closer association between the physical and biological sciences.

Radiation and the Lymphatic System

(ERDA Symposium Series)
Chairman: John E. Ballou, Battelle, Pacific Northwest Laboratories
Energy Research and Development Administration, 1976. 264 pp., 9 by 11.
Available from NTIS as CONF-740930. Paper copy, $9.00. Microfiche, $3.00.
LC 75-38685 (CIP)
Proceedings of the Fourteenth Annual Hanford Biology Symposium, Sept. 30–Oct. 2, 1974, Richland, Wash., sponsored by Battelle, Pacific Northwest Laboratories, and U. S. Atomic Energy Commission. This book is based on a diversity of interests in the broad field of research on the role of the lymphatic system in radiation injury. An up-to-date view of current research related to the complexities of lymphatic function is given, and a comprehensive compilation of recent information on lymph nodal transfer kinetics, accumulations in lymphatics, pathologic effects, and dosimetric considerations is provided. The papers also include lymphogenesis, hematopoiesis, immunocompetence, and the exciting implications related to cancer induction.
CONTENTS: Five main subject areas: Radiation and lymph node function (4 papers). Radiation and the pulmonary lymphatics (6 papers). Radiation effects on lymphocytes (11 papers). Radiation and the immune response (7 papers). Radiation-induced histopathology including lymphoid cancer (6 papers). Index.

Radiation, Radioactivity, and Insects

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
R. D. O'Brien, Cornell University, and L. S. Wolfe, Montreal Neurological Institute
Academic Press, 1964. 211 pp., 6 by 9. Available from University Microfilms as
PB2184. Xerographic copy, paper binding, $25.90. Microfilm, $8.70.
LC 63-23198
A book designed for graduate and undergraduate students as well as for research workers. It gives a complete account of the contributions made by the use of radiation and radioisotopes methods to our knowledge of insects and insect control. It serves not only as an introduction to these important techniques for entomologists but also as a description of the advantages that insects offer as subjects for work with radiation and radioisotopes.

Radioactive Pharmaceuticals

(AEC Symposium Series)

Editors: Gould A. Andrews and Ralph M. Kniseley, Oak Ridge Associated Universities, and Henry N. Wagner, Jr., The Johns Hopkins Medical Institutions.
Technical Editor: Elizabeth B. Anderson, Oak Ridge Associated Universities
U. S. Atomic Energy Commission, 1966. 702 pp., 6 by 9. Available from NTIS as CONF-651111. Paper copy, $6.00. Microfiche, $3.00.
LC 66-60068

Proceedings of a symposium held at the Oak Ridge Institute of Nuclear Studies, Nov. 1–4, 1965. This symposium is a sequel to the 1962 symposium "Progress in Medical Radioisotope Scanning" (AEC Symposium Series, TID-7673) and the 1963 symposium "Dynamic Clinical Studies with Radioisotopes" (AEC Symposium Series, TID-7678).

The Radiobiology of Cultured Mammalian Cells

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)

Mortimer M. Elkind, National Cancer Institute, National Institutes of Health, and Gordon F. Whitmore, University of Toronto and the Ontario Cancer Institute
Gordon and Breach, 1967. 615 pp., 6 by 9, $63.00.
LC 66-27013 ISBN 0-677-10920

A book that will supply a didactic base for the student and a critical review for the active researcher. It develops and reviews the principal radiobiological topics that have been examined with cultured mammalian cells. For this to be done in a logical fashion, work has been drawn from bacteria, yeasts, and plants and the discussion extended to in vivo assay systems.

Radiobiology of Plutonium

Editors: Betsy J. Stover, University of North Carolina and University of Utah, and Webster S. S. Jee, University of Utah. Technical Editor: Jeffrey S. Montague, University of Utah
J. W. Press, 1972. 588 pp., 6 by 9, $10.00.

A book reviewing and appraising our knowledge of the metabolism and biological effects of plutonium. This book contains data and ideas that should be of great interest to physicians (especially radiologists and pathologists), biochemists, biophysicists, radiobiologists, veterinarians, health physicists, ecologists, and epidemiologists, as well as research workers in metabolism, physiology, biochemistry, biophysics, pathology, nuclear medicine, and cancer. It presents a comprehensive view of both the problems and the progress in radiobiological research with transuranium elements.

CONTENTS: Six main subject areas: Metabolism and effects of ^{239}Pu(IV) given intravenously to young adult beagle and related studies (9 papers). Effects of ^{239}Pu given subcutaneously and by inhalation and related studies (5 papers). Metabolism and effects of ^{239}Pu in rodents (3 papers). Relationship between basic knowledge of the skeleton and the assessment of the effects of ^{239}Pu (4 papers). Analyses of the effects of ^{239}Pu and related radionuclides and the use of chelating agents in decorporation of radionuclides (4 papers). ^{239}Pu, ^{226}Ra, and related radionuclides in man (3 papers). Index.

Radioisotopes in the Human Body: Physical and Biological Aspects

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)

F. W. Spiers, University of Leeds, England
Academic Press, 1968. 346 pp., 6 by 9, $19.50.
LC 68-16515 ISBN 0-12-657750-1

A comprehensive description of the manner in which radioisotopes become deposited in the human body and of the methods of determining the consequent physical dose to the body tissues. Deposition of radioisotopes in bone receives special emphasis.

Radioisotopes and Inquiry

Bio-Atomic Research Foundation
Encyclopaedia Britannica Educational Corp., 1968. 185 pp., 6 by 9. Available from University Microfilms as PB2189 for teacher's manual and PB2187 for student text. Xerographic copy, paper binding: teacher's manual, $22.70; student text, $21.20. Microfilm: teacher's manual, $7.60; student text, $7.10.

A book designed to bring fundamental radiological techniques within reach of the average high-school biology class. The experiments can be done with simple and inexpensive materials. The student's edition does not reveal probable results; the teacher's edition includes a glossary, bibliography, and nuclear data.

Radioisotopes in Medicine: In Vitro Studies

(AEC Symposium Series)

Editors: Raymond L. Hayes and Francis A. Goswitz, Oak Ridge Associated Universities, and Beverley E. Pearson Murphy, Queen Mary Veterans Hospital, Montreal. Technical Editor: Elizabeth B. Anderson, Oak Ridge Associated Universities

U. S. Atomic Energy Commission, 1968. 753 pp., 6 by 9. Available from NTIS as CONF-671111. Paper copy, $6.00. Microfiche, $3.00.

LC 68-60071

Proceedings of a symposium held at the Oak Ridge Associated Universities, Nov. 13–16, 1967, sponsored by Oak Ridge Associated Universities and the U. S. Atomic Energy Commission. This book is a valuable text for any clinician or investigator interested in the fundamental principles and applications of hormone radioimmunoassays and protein-binding studies, activation analysis, and cytologic and chromosomal labeling in medicine. These in vitro techniques use radioisotopes but do not expose the subject to ionizing radiation and do not demand complex or expensive equipment for the laboratory.

Radionuclide Carcinogenesis

(AEC Symposium Series)

Coordinators: C. L. Sanders and R. H. Busch, Pacific Northwest Laboratory

U. S. Atomic Energy Commission, 1973. 506 pp., 6 by 9. Available from NTIS as CONF-720505. Paper copy, $13.60. Microfiche, $3.00.

LC 73-600127

Proceedings of the Twelfth Annual Hanford Biology Symposium, May 11–13, 1972, Richland, Wash., sponsored by the Pacific Northwest Laboratory and the U. S. Atomic Energy Commission. The papers reflect an increased emphasis on hormones, viruses, nonradioactive cocarcinogens, and tumor-producing agents acting together with radionuclides to induce tumors. Also discussed are retrospective epidemiologic studies in human populations exposed accidentally, occupationally, or medically to alpha emitters and attempts to relate observations in experimental animals to man.

CONTENTS: Five main subject areas: Radioiodine and heavy-particle radiation (6 papers). Multiple factors (8 papers). Inhaled radionuclides (5 papers). Cellular and subcellular aspects (10 papers). Human studies—alpha emitters (7 papers). Index.

Space Radiation Biology and Related Topics

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)

Editors: Cornelius A. Tobias, Donner Laboratory, and Paul Todd, The Pennsylvania State University

Academic Press, 1974. 664 pp., 6 by 9, $39.50.

LC 72-12190 (CIP) ISBN 0-12-691850-3

A presentation of some of the timeless fundamentals and of progress in space radiation biology. Progress in the acceleration of heavy ions to energies comparable to those found in cosmic rays has led to significant fundamental biological knowledge and to potentially useful applications of densely ionizing radiations in medicine and technology. Also, radiation-induced abiogenic synthesis of biological compounds has been influential in man's thinking about the origin of life and the possibilities of its extraterrestrial existence. The organization of this book proceeds from the fundamental to the complex. Some speculation and theories are deliberately included, and a certain amount of original data is incorporated in nearly every chapter.

CONTENTS: Historical survey of space radiation biology. Radiation physics and current hazards evaluation. Appendix: solar electromagnetic radiation. Particle irradiation methods. Cellular radiation biology. Radiation and molecular and biological evolution. Magnetic fields and their biological effects. Appendix: relevant principles of magnetism and biomagnetics. Results of radiobiological experiments on satellites. Mammalian radiobiology and space flight. Circadian rhythmometry of mammalian radiosensitivity. Human radiation tolerance. Mathematical models of mammalian radiation response for space applications. Appendix: cell kinetics and radiation recovery models. Current topics in space radiation biology. Index.

Swine in Biomedical Research

Editors: L. K. Bustad, Pacific Northwest Laboratory, and R. O. McClellan, Division of Biology and Medicine, U. S. Atomic Energy Commission
Frayn Printing Co., 1966. 825 pp., 6 by 9, $12.50.

LC 66-23515

The proceedings of a symposium held at the Pacific Northwest Laboratory, Richland, Wash., July 19–21, 1965. This book provides a comprehensive review of the basis for and the extent of the utilization of swine in biomedical research. Included are more than 60 individual papers, as well as panel discussions, on housing, handling, nutrition, disease control, cardiovascular research, and miniature-swine development.

Tissue Grafting and Radiation

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
H. S. Micklem and John F. Loutit, Medical Research Council, Harwell, England
Academic Press, 1966. 228 pp., 6 by 9, $8.00.

LC 65-28623 ISBN 0-12-494650-X

An account of the common ground between tissue transplantation and radiation biology.

Toxicology of Uranium: Survey and Collected Papers

(National Nuclear Energy Series, Division IV, Volume 23)
Editor: Albert Tannenbaum, Medical Research Institute, Michael Reese Hospital
McGraw-Hill, 1951. 333 pp., 6 by 9. Available from University Microfilms as OP13867 ED1: Xerographic copy, paper binding, $41.00. Microfilm (35 mm), $13.70. Also available from Microforms International: Microfilm (16 mm), $12.00.

A report on investigations on the toxicology of uranium compounds together with associated studies. It is not intended as a complete textbook of uranium pharmacology and toxicology.

Tritium-Labeled Molecules in Biology and Medicine

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
Ludwig E. Feinendegen, Institute of Medicine, Julich, Germany
Academic Press, 1967. 430 pp., 6 by 9, $22.50.

LC 67-23155 ISBN 0-12-251550-1

A detailed discussion of the various factors affecting the use of tritium-labeled compounds as tracers in biological and medical research. The book provides an introduction to the physics of tritium and contains a review and evaluation of the chemistry and production of tritiated compounds, counting techniques, autoradiography, and the toxicity of tritium in living systems. General factors influencing the cellular incorporation of a precursor, mainly for nucleic acids, are discussed, and a survey is made of present-day theory and application of tritium as a tracer.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

Experimental Lung Cancer: Carcinogenesis and Bioassays
Seattle, Wash. June 23–26, 1974. Sponsored by Battelle Memorial Institute, Battelle Institute Life Science Program, U. S. Atomic Energy Commission, and Deutsche Forschungsgemeinschaft. 1974. 723 pp. Available from Springer-Verlag. $34.90.

Nutrition and Agricultural Development: Significance and Potential for the Tropics
Basic Life Sciences series, Volume 7
Proceedings of the Fourteenth International Biological Symposium
Guatemala City, Guatemala, Dec. 2–6, 1974. Sponsored by Pan American Health Organization, Organization of American States, U. S. Atomic Energy Commission, Williams–Waterman Program of the Research Corporation, Ford Foundation, and Rockefeller Foundation. 1976. 524 pp. Available from Plenum. $39.50.

The Reticuloendothelial System in Health and Disease
Advances in Experimental Medicine and Biology, Volumes 73A and 73B
Proceedings of the 7th International Congress of the Reticuloendothelial Society and First Meeting of the European Reticuloendothelial Society
Pamplona, Spain. Sept. 15–20, 1975. Sponsored by pharmaceutical companies, members of

the Reticuloendothelial Society, and Energy Research and Development Administration. 1976.
Functions and Characteristics. 527 pp. Available from Plenum. $39.50.
Immunologic and Pathologic Aspects. 508 pp. Available from Plenum. $39.50.

Sharing of Computer Programs and Technology in Nuclear Medicine
Proceedings of Fourth Symposium
Oak Ridge, Tenn. May 8, 1974. Sponsored by Oak Ridge National Laboratory. 1974. 207 pp. Available from NTIS as CONF-740531.

Stable Isotopes, Proceedings of the Second International Conference on
Oak Brook, Ill. Oct. 20–23, 1975. Sponsored by Argonne Nation[illegible] Supported by Merck, Sharp and Dohme, Ltd., G. D. Searle and Co., Inc., and The Un[illegible]ersity of Chicago. 1976. 768 pp. Available from NTIS as CONF-751027.

Synapse, The
Cold Spring Harbor Symposia on Quantitative Biology, Volume XL
Cold Spring Harbor, N. Y. June 3–10, 1975. Sponsored by National Science Foundation, National Institutes of Health, and U. S. Energy Research and Development Administration. 1976. Available from Cold Spring Harbor Laboratory. $36.00.

RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Accelerator Produced Nuclides for Use in Biology and Medicine, A Bibliography, 1939–1973
Brookhaven National Laboratory. April 1975. 188 pp. Available from NTIS as BNL-50448.

Biology of the Transuranium Elements
Battelle, Pacific Northwest Laboratories. July 1976. 239 pp. Available from NTIS as BNWL-2056.

Cardiac Pacemakers and Mechanical Hearts, A Bibliography of Radioisotope Power Sources
USAEC Technical Information Center. April 1973. 45 pp. Available from NTIS as TID-3335.

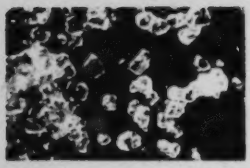
Chemical Mutagenesis
Oak Ridge National Laboratory.
In Laboratory Mammals, A Bibliography on the Effects of Chemicals on Germ Cells
March 1976. 105 pp. Available from NTIS as ORNL/EMIC-6(Rev.).
In Plants and Mutagenicity of Plant Related Compounds
1976. 327 pp. Available from NTIS as ORNL/EMIC-7.
A Survey of the 1974–1975 Literature
1976. 311 pp. Available from NTIS as ORNL/EMIC-8.
(Bibliographies on this subject for previous years are also available.)

Effects of Electromagnetic Fields Below 30 MHZ on Animal Biology
Lawrence Livermore Laboratory. Aug. 15, 1976. 14 pp. Available from NTIS as UCRL-51880.

Human Radiation Dose Studies
USAEC Technical Information Center. December 1974. 88 pp. Available from NTIS as TID-3348.

Nuclear Medicine
Bibliography from Nuclear Science Abstracts, Volumes 28–30
ERDA Technical Information Center. July 1975. 379 pp. Available from NTIS as TID-3319-S6.
Bibliography from Nuclear Science Abstracts, Volumes 31–33
ERDA Technical Information Center. December 1976. 503 pp. Available from NTIS as TID-3319-S7.
(Bibliographies on this subject for previous years are also available.)

Theoretical Population Genetics, Bibliography of
Washington University, Seattle. 1974. 454 pp. Available from NTIS as RLO-2225-5-18.



CHEMISTRY

The Actinide Elements

(National Nuclear Energy Series, Division IV, Volume 14A)

Editors: Glenn T. Seaborg, Radiation Laboratory, University of California, and Joseph J. Katz, Chemistry Division, Argonne National Laboratory

McGraw-Hill, 1954. 870 pp., 6 by 9. Available from University Microfilms as
OP10620: Xerographic copy, paper binding, $102.60. Microfilm (35 mm), $34.20.
Also available from Microforms International: Microfilm (16 mm), $30.75.

A comprehensive survey of the chemistry and nuclear properties of the actinide elements.

Advances in Molten Salt Chemistry

(Volumes 1, 2, and 3)

Editors: J. Braunstein, Oak Ridge National Laboratory, Gleb Mamantov, University of Tennessee, and G. P. Smith, Oak Ridge National Laboratory

Plenum. All volumes 6 by 9.
LC 78-131884

Volume 1
1971, 296 pp., $27.50.
ISBN 0-306-39701-3

Volume 2
1973. 275 pp., $27.50.
ISBN 0-306-39702-1

Volume 3
1975. 458 pp., $38.50.
ISBN 0-306-39703-X

A continuing series designed to provide investigators in the many aspects of molten salts with a way for keeping abreast of recent developments in molten salts and in related specialties. An effort is made to maintain a balance among theoretical, experimental, and applied topics in molten salts and peripheral areas.

CONTENTS:

Volume 1. Vibrational spectroscopy of molten salts. Liquid extraction from molten salts. Molten salt chemistry of the haloaluminates. Molten salt batteries and fuel cells. Thermodynamic studies, by mass spectrometry, of molten mixed halide systems. Author, formula, and subject indexes.

Volume 2. Molten organic salts—physical properties. Solubilities of reactive gases in molten salts. High-temperature coordination chemistry of Group VIII (includes Appen-

dixes A to D). Electroanalytical chemistry in molten salts—a review of recent developments. Index.

Volume 3. Molecular dynamics calculations on molten ionic salts. Gas solubility in molten salts. Organic reactions in molten tetrachloroaluminate solvents. Experimental techniques in molten fluoride chemistry. The chemistry of thiocyanate melts. Phase diagrams of binary and ternary fluoride systems (237 diagrams). Index.

The Analysis of Elemental Boron

(AEC Critical Review Series)

Morris W. Lerner, New Brunswick Laboratory, U. S. Atomic Energy Commission

U. S. Atomic Energy Commission, 1970. 125 pp., 7 by 10. Available from NTIS as TID-25190. Paper Copy, $3.00. Microfiche, $3.00.

LC 74-607964

A concise presentation covering the determination of the isotopic ratio, the boron separation, and the preparation of the commonly used mass spectrometric charge material, sodium tetraborate and boron trifluoride. This review gives methods of determining boron in elemental boron, boron carbide, and various boron mixtures and describes methods of determining impurities in elemental boron. The motivation for this study came primarily from the author's participation in a cooperative boron-analysis program, and many of the methods described are those of the laboratories that took part in the program.

Analysis of Essential Nuclear Reactor Materials

Editor: C. J. Rodden, New Brunswick Laboratory, U. S. Atomic Energy Commission, with contributions from other authorities

U. S. Atomic Energy Commission, 1964. 1291 pp., 6 by 9. Available from NTIS as TID-21384. Available only as microfiche or copy enlarged from microfiche; price schedule on page iii.

LC 64-60035

A book that gives the analytical chemist the information needed to carry out many of the analyses of the most important nuclear materials without the necessity of further literature searching. The book is a laboratory reference work with the physical and inorganic chemistry aspects of the subjects held to a minimum. It is divided into two parts: one part describes methods for determining individual elements, and the other part deals with general instrument methods.

Analytical Chemistry of the Manhattan Project

(National Nuclear Energy Series, Division VIII, Volume 1)

Clement J. Rodden, New Brunswick Laboratory, U. S. Atomic Energy Commission

McGraw-Hill, 1950. 748 pp., 6 by 9. Available from University Microfilms as OP16859: Xerographic copy, paper binding, $87.60. Microfilm (35 mm), $29.20.

Also available from Microforms International: Microfilm (16 mm), $26.00.

An outline of the analytical chemistry methods used during the Manhattan Project.

Applied Gamma-Ray Spectrometry

(Second edition)

C. E. Crouthamel, Argonne National Laboratory

Revisers: F. Adams and R. Dams, Ghent State University

Pergamon Press, 1970. 776 pp., 7 by 10, $32.00.

LC 79-114847 ISBN 0-08-006888-X

Book primarily meant for experimentalists. This edition, as did the first, deals with the intrinsic and extrinsic variables that affect the observed gamma and X-ray spectra obtained with semiconductor, scintillation, and proportional detectors. The amplification and analyzing equipment, the qualitative and quantitative interpretation of the spectra, and a number of widely used applications are described and discussed. The appendixes provide a catalog of some 450 spectra measured with semiconductor and scintillation detectors, data on the calibration of detectors, and tabulation of the characteristic X-ray energies and of the nuclear data by photon energy and half-life sequence. Suitable for graduate students and research workers and for interested persons in nuclear medicine and geology, health physics, and nuclear spectroscopy, the second edition is completely revised and enlarged. Volume 41 of the International Series of Monographs in Analytical Chemistry.

Bibliography of Research on Heavy Hydrogen Compounds

(National Nuclear Energy Series, Division III, Volume 4C)

Compiler: Alice H. Kimball. Editors: Harold C. Urey, Institute for Nuclear Studies, University of Chicago, and Isidor Kirshenbaum, Esso Laboratories, Standard Oil Development Company

(Compiler and editors formerly at S.A.M. Laboratories, Columbia University)

McGraw-Hill, 1949. 350 pp., 6 by 9. Available from University Microfilms as OP6235: Xerographic copy, paper binding, $41.80. Microfilm (35 mm), $14.00. Also available from Microforms International: Microfilm (16 mm), $12.50.

A bibliography of research on heavy hydrogen and its compounds, arranged alphabetically according to the name of the senior author of each work.

Carbon-14

Vernon F. Raaen, Oak Ridge National Laboratory, Gus A. Ropp, Coker College, and Helen P. Raaen, Oak Ridge National Laboratory

McGraw-Hill, 1968. 388 pp., 6 by 9, $22.50.

LC 67-20178 ISBN 0-07-051085-7

A concise treatise on the principles of use, experimental technology, and typical applications of ^{14}C in organic chemistry. This book is of special interest to biochemists or to scientists in any discipline working with organic chemical reactions.

Chemical Processing and Equipment

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1955, presentation volume)

Staffs of National Reactor Testing Station and Brookhaven National Laboratory

McGraw-Hill, 1955. 302 pp., 8 by 10. Available from University Microfilms as OP34378: Xerographic copy, paper binding, $35.70. Microfilm, $11.90.

A description of the chemical processing of reactor fuel elements at the Idaho Chemical Processing Plant.

Chemical Processing Equipment: Electromagnetic Separation Process

(National Nuclear Energy Series, Division I, Volume 12)

G. A. Akin, H. P. Kackenmaster, R. J. Schrader, J. W. Strohecker, and R. E. Tate, Tennessee Eastman Corporation

U. S. Atomic Energy Commission, 1951. 506 pp., 6 by 9. Available from University Microfilms as OP33507: Xerographic copy, paper binding, $59.30. Microfilm (35 mm), $19.80. Also available from Microforms International: Microfilm (16 mm), $17.75.

An outline of the general scope of the chemical processing equipment connected with the electromagnetic method of separating the isotopes of uranium.

The Chemistry of Americium

(ERDA Critical Review Series)

Wallace W. Schulz, Atlantic Richfield Hanford Company

Energy Research and Development Administration, 1976. 300 pp., 7 by 10. Available from NTIS as TID-26971. Paper copy, $6.75. Microfiche, $3.00.

LC 76-25824 (CIP)

A collection and review of the essential features of the descriptive chemistry of americium as it is known in the mid-1970s. This is a review within the traditional occurrence—properties—compounds—uses framework but is also motivated by the great advances in americium chemistry during the past decade. All presently known inorganic and organic compounds of americium and some of their properties are tabulated, as are formation constants of aqueous complexes of americium. 1200 references.

CONTENTS: Discovery; atomic and nuclear properties; collateral reading. Production and uses. Chemistry in aqueous solution. Metal, alloys, and compounds. Recovery; separation; purification. Author and subject indexes.

The Chemistry and Metallurgy of Miscellaneous Materials

(National Nuclear Energy Series, Division IV, Volume 19C)

Editor: Laurence L. Quill, Department of Chemistry, Michigan State College

U. S. Atomic Energy Commission, 1955. 172 pp., 8 by 11. Available from NTIS as TID-5212: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A presentation on the crystal chemistry of many materials, on geochemistry, on the chemistry and metallurgy of beryllium and rare-earth elements, and on other related topics.

The Chemistry and Metallurgy of Miscellaneous Materials: Thermodynamics

(National Nuclear Energy Series, Division IV, Volume 19B)

Editor: Laurence L. Quill, Department of Chemistry, Michigan State College

McGraw-Hill, 1950. 329 pp., 6 by 9. Available from University Microfilms as OP10618: Xerographic copy, paper binding, $40.10. Microfilm (35 mm), $13.40. Also available from Microforms International: Microfilm (16 mm), $12.00.

A presentation on material relating to thermodynamics in the broad categories of metallurgy, refractories, and general chemistry.

The Chemistry of Plutonium

J. M. Cleveland, The Dow Chemical Company

Gordon and Breach, 1970. 653 pp., 6 by 9. Available from American Nuclear Society, $39.50.
LC 70-92092

A comprehensive and authoritative treatise for chemists and chemical engineers concerned with the technological aspects of the use of plutonium in the nuclear age.

The Chemistry of Uranium: Part I. The Element, Its Binary and Related Compounds

(National Nuclear Energy Series, Division VIII, Volume 5)

Joseph J. Katz, Chemistry Division, Argonne National Laboratory, and Eugene Rabinowitch, University of Illinois

McGraw-Hill 1951. 609 pp., 6 by 9. Available from University Microfilms as OP2250 P1: Xerographic copy, paper binding, $72.00. Microfilm (35 mm), $24.00. Also available from Microforms International: Microfilm (16 mm), $21.50.

A presentation of the results of a program of experimental research in uranium chemistry undertaken at the inception of the Atomic Energy Project.

Contemporary Chemistry: Concepts and Issues

Edward A. Walters, University of New Mexico, and Eugene M. Wewerka, Los Alamos Scientific Laboratory

Charles E. Merrill Publishing Co., 1974. 500 pp., 7 by 10, $10.50.
LC 73-89908 ISBN 0-675-08853-4

A presentation of selected parts of the field of chemistry, using terms and illustrations that most beginning students will find familiar and informative. The role of energy in determining the course of change serves as a continuous thread, or reference point, throughout the book. The first section deals with fundamental concepts. From the second section topics can be selected to fit the interests of the class. The final four chapters, which deal with energy and the environment, can be studied as an independent section.

CONTENTS: Part I: Chemical Concepts. The atomic model of matter. Some representative elements. The chemist's view of matter and the importance of energy. The energetics of chemical conversions. Digression on the atom. The oaths between hydrogen and oxygen. In which we define the mole and explore some small and large numbers. Contemporary chemistry: concepts and issues. Part 2: Chemistry—Society Interface. The unstable nucleus. Compounds of carbon. Petroleum. Polymers. Biochemistry. Drugs and pharmaceuticals. Energy sources and resources. The energy crisis: fossil fuels and the environment. Prospects for energy and the environment. Our wastes: what do we do with what's left? Appendixes: table of atomic weights; the Boltzmann equation; units of energy and conversion factors. Glossary. Index.

Enriched Uranium Processing

Finis S. Patton, John M. Googin, and William L. Griffith, Union Carbide Nuclear Company

Pergamon Press, 1963. 282 pp., 6 by 9. Available at Microforms International.
Copyflo, soft binding, $31.00 (add $6.00 for a hard cover). Microfiche, $22.20. Microfilm (16 or 35 mm), $14.80. Cartridge (16 mm), $17.80.

A monograph addressed to readers in contact with the subject for the first time, to actively engaged technical personnel, and to the specialist seeking to correlate his specialized knowledge with other vocations in the nuclear field. In selection and organization of subject matter, emphasis was placed on practical application; principles and operations prominently treated have shown through the test of time that they are unlikely to undergo early obsolescence. General chemical and metallurgical operations likely to be common to any enriched uranium process and the health, safety, and economic factors that contribute to their special character are reviewed. Procedural details of the manufacture of specific fuel-element designs for well-known reactors have been omitted. Volume 2 of Division IX, Chemical Engineering, International Series of Monographs on Nuclear Energy.

CONTENTS: Introduction. Process chemical operations. Metallurgical and ceramics operations. Radiation safety. Uranium control. Plant design. Economics and management. Author and subject indexes.

The Extractive Metallurgy of Uranium

Robert C. Merritt, Colorado School of Mines Research Institute

Colorado School of Mines Research Institute, 1971. 595 pp., 6 by 9, $15.00.
LC 71-157076

A survey and review of the 1967–1968 status of the technology in the uranium ore processing industry in the United States. Although this presentation emphasizes plant practice in the United States, the discussion of general technology necessarily includes information from worldwide practice. Also, a number of processes techniques are described which have been evaluated only on a laboratory basis but which contribute to the technology and which, therefore, may be useful in the future. This volume updates "Uranium Ore Processing."

Geochemistry of Oilfield Waters: Developments in Petroleum Science, 1

A. Gene Collins, Bartlesville Energy Research Center

Elsevier Publishing Co., 1975. 496 pp., 7 by 10, $21.25.
LC 73-89149 ISBN 0-444-41183-6

Information relevant to the analytical chemistry and geochemistry of oilfield waters. Recognition is shown of the importance of subsurface oilfield waters as they are related to the origin, migration, accumulation, and maturation of oil and gas and thus their relationship to exploration for the production of oil and gas. Because oilfield waters can constitute an environmental pollution hazard, the book describes and comments on methods of their disposal or the recovery of valuable constituents from them.

CONTENTS: Introduction. Sampling subsurface oilfield waters. Analysis of oilfield waters for some physical properties and inorganic chemical constituents. Interpretation of chemical analysis of oilfield waters. Significance of some inorganic constituents and physical properties of oilfield waters. Organic constituents in saline waters. Origin of oilfield waters. Classification of oilfield waters. Some effects of water upon the generation, migration, accumulation, and alteration of petroleum. Geochemical methods of exploration for petroleum and natural gas. Geopressured reservoirs. Compatibility of oilfield waters. Valuable minerals in oilfield waters. Subsurface disposal. Solubilities of some silicate minerals in saline waters. Environmental impact of oil- and gas-well drilling, production, and associated waste disposal practices. Reference index. Subject index.

Guide to Activation Analysis

Editor: William S. Lyon, Jr., Oak Ridge National Laboratory. Authors: staff of Oak Ridge National Laboratory

D. Van Nostrand Co., 1964. 186 pp., 6 by 9. Available from Krieger, $9.50.
LC 64-23964

A state-of-the-art presentation, as well as an exhaustive reference work, including detailed discussions of modern instrumental methods, neutron-flux monitoring problems, special applications, and new systems. The book comprises a concentration of the results of experiences gathered from the performance of over 300,000 nuclear analyses. The principles that have been developed and illustrated are applied to the solution of representative activation-analysis problems; calculations in these problems are shown in detail. This guide, written with sufficient clarity for the neophyte and sufficient depth for the sophisticate, should be of value to those actively engaged or interested in nuclear methods of analysis.

Handbook of Fluorescence Spectra of Aromatic Molecules

(Second edition)

Isadore B. Berlman, Argonne National Laboratory and Hebrew University, Israel
Academic Press, 1971. 487 pp., 6 by 9, $39.50.

LC 78-154388 ISBN 0-12-092656-3

A handbook containing spectra of more than 200 aromatic molecules that vary in size, shape, and structure from the simple aromatic molecule benzene through the larger and more complicated systems. Included are data characteristic of the fluorescence process, *e.g.*, decay time, quantum yield, statistical width, Stokes' loss, and average wavelength. Special attention is given to organic scintillators and fluors used in liquid lasers. This book will be a useful guide for organic chemists and laboratory workers using lasers and scintillators, as well as those whose work or study requires an understanding of the luminescence, fluorescence, and scintillation processes. This edition includes more than twice the number of compounds covered in the first edition. The compounds added fall into the following classes: p-oligophenylenes, indole derivatives, fluoranthene derivatives, naphthalene derivatives, biphenyl derivatives, and biological stains. All measurements were made at Argonne National Laboratory, and a good deal of the data is published for the first time. The bibliographies have been updated, and two new sections have been added to the appendix.

Helium-3 and Helium-4

William E. Keller, Los Alamos Scientific Laboratory
Plenum, 1969. 431 pp., 6 by 9, $35.00.

LC 68-25382

A broad outline of the theory and experimental methods pertinent to these two stable isotopes of helium, with special emphasis on experimental results and their interpretation.

Inorganic Vibrational Spectroscopy

(Volume 1)

Llewellyn H. Jones, Los Alamos Scientific Laboratory
Marcel Dekker, Inc., 1971. 218 pp., 6 by 9, $35.50.

LC 72-146803 ISBN 0-8247-1335-4

A book written primarily for the inorganic chemist who has not specialized in the field but who wishes to apply it either to his own work or toward evaluation of other workers' results and interpretations. This book outlines how one can go about determining meaningful potential energy constants for a molecule and evaluating their significance. The author uses the term "potential constants" to cover both force constants and compliance constants, which are related.

Introductory Group Theory and Its Application to Molecular Structure

(Second edition)

John R. Ferraro, Argonne National Laboratory, and Joseph S. Ziomek, consultant, Argonne National Laboratory
Plenum, 1975. 292 pp., 6 by 9, $19.15.

LC 75-33752 (CIP) ISBN 0-306-30786-5

A text intended for scientists and students with only a limited theoretical background in spectroscopy. The discussion of point symmetry includes space symmetry. The selection rules include space group selection rules (for $k = 0$). This work explains, in nonmathematical terms, the fundamentals, combinations, and overtones of molecules in several point groups and provides step-by-step instructions on how to use group theory in interpreting molecular spectra and determining molecular structure. Examples from the literature are given to illustrate the use of group theory.

CONTENTS: Symbols and abbreviations. Symmetry. Derivation of selection rules. Potential force fields. The normal coordinate treatment for molecules with C_{2v}, C_{3v}, and O_h symmetry. Applications of group theory for the determination of molecular structure. Eleven appendixes. Index.

Ion–Molecule Reactions

E. W. McDaniel, Georgia Institute of Technology, V. Čermák, Czechoslovak Academy of Sciences, A. Dalgarno, Harvard University, E. E. Ferguson, Environmental Science Services Administration, and L. Friedman, Brookhaven National Laboratory

John Wiley & Sons, 1970. 387 pp., 6 by 9, $26.25.
LC 70-91647 ISBN 0-471-58386-3

A monograph that attempts to provide a balanced coverage of the field. This volume discusses all the known experimental methods for making quantitative studies of ion–molecule reactions, and a critical analysis is made of the accuracy and reliability of these methods. Theoretical foundations of the subject and various models that have been adopted in computations of reaction rates are discussed. Measurements in the earth's atmosphere from which information on ion–molecule reactions has been deduced are reviewed, and ion–molecule chemistry is discussed. Experimental data on 230 ion–molecule reactions are given in tabular and graphical form. A volume in the Wiley-Interscience Atomic and Molecular Collisional Processes series.

Ion–Molecule Reactions: Their Role in Radiation Chemistry

(American Chemical Society–Energy Research and Development Administration Monograph)

Sharon G. Lias and Pierre Ausloos, Institute for Materials Research, National Bureau of Standards
American Chemical Society, 1975. 214 pp., 6 by 9, $16.50.
LC 75-26904 (CIP) ISBN 0-8412-0299-0

A review of ion–molecule reactions with special emphasis on interpreting the role of such reactions in systems under high-energy irradiation. This presentation integrates information from the various mass spectrometric techniques, from organic chemistry, from nuclear magnetic resonance studies, from theoretical calculations, and from gas- and liquid-phase radiation chemistry. The book will be of value to the experimenter needing a review of ion–molecule reactions directed especially toward problems arising in radiation chemistry, to the ion–molecule kineticist wanting a review of various aspects of the subject, and to persons interested in specific information about ion–molecule reactions in a particular system.

CONTENTS: Ion–molecule reactions and their role in radiation chemistry. Unimolecular processes; the nature and structure of ionic intermediates in radiolysis. Ion lifetimes and the fate of unreactive ions. Kinetics and mechanisms of ion–molecule reactions. Proton transfer reactions. Negative atom and two-atom transfer reactions. Condensation reactions. Association or clustering reactions. Index.

Kinetics of the Oxidation–Reduction Reactions of Uranium, Neptunium, Plutonium, and Americium Ions in Aqueous Solutions

(ERDA Critical Review Series)

T. W. Newton, Los Alamos Scientific Laboratory
Energy Research and Development Administration, 1975. 140 pp., 7 by 10.
Available from NTIS as TID-26506. Paper copy, $5.45. Microfiche, $3.00.
LC 75-22030 (CIP)

A review of the rates of the reactions in which the oxidation states change. The author discusses properties of the aqueous ions as well as some general aspects of kinetics and mechanisms applicable to aqueous oxidation–reduction reactions. Typical reactions are discussed in detail, with special attention to interpretation of the observed rate laws. In addition, all available data are presented in tabular form. Correlations are made to help in predicting the rates of reactions that have not been measured.

CONTENTS: Introduction. Preliminary considerations. Kinetics of some typical reactions. Reactions among the ions of uranium, neptunium, and plutonium. Effects of self-irradiation in plutonium solutions. Reactions of americium ions. Effect of ionic strength. Thermodynamic quantities for the overall processes and activation processes. Empirical correlations. Catalog of reaction rates. References. Index.

Low-Frequency Vibrations of Inorganic and Coordination Compounds

John R. Ferraro, Argonne National Laboratory
Plenum, 1971. 323 pp., 6 by 9, $27.50.
LC 74-107528

A book intended for chemists and spectroscopists who are using the far-infrared region in studying inorganic and coordination compounds. The author presents virtually everything that a present or potential user of the far-infrared region might need to know, including a historical sketch of how the region has been used; a thorough evaluation of commercially available grating/prism and interferometric instruments; a detailed discussion of sampling

techniques, instrument calibration, the slow-neutron-scattering (SNS) technique, and high-pressure techniques; and the correlation and evaluation of low-frequency vibrations. Bibliographies are given at the end of each chapter.

Neptunium-237 Production and Recovery

(AEC Critical Review Series)

Wallace W. Schulz and Glen E. Benedict, Atlantic Richfield Hanford Company

U. S. Atomic Energy Commission, 1972. 94 pp., 7 by 10. Available from NTIS as TID-25955. Paper copy, $3.00. Microfiche, $3.00.

LC 72-600249

A review providing valuable background information on neptunium recovery methods for new plants. The authors have covered all the known methods for recovering ^{237}Np, the precursor of the valuable power source ^{238}Pu, including several no longer in use. In this review they accomplish the following objectives: focus attention on techniques for recovering ^{237}Np from aqueous nitrate media; update chemical flow sheets; review critically and concisely more than 10 years of plant experience and associated research and development; evaluate foreign experience; evaluate plans of domestic commercial fuel reprocessors to recover neptunium; and project the supply and demand for ^{237}Np.

CONTENTS: Neptunium-237 supply and demand. Recovery of neptunium from aqueous solutions. Nonaqueous methods for the recovery and separation of neptunium. Author and subject indexes.

Noble-Gas Compounds

Editor: Herbert H. Hyman, Argonne National Laboratory

University of Chicago Press, 1963. 404 pp., 6 by 9, $15.00.

LC 63-20907 ISBN 0-226-36540-9

A summary of the material made available at a two-day meeting at Argonne National Laboratory, in April 1963, of the scientists who had contributed to the study of noble-gas compounds.

Nuclear Science Series: Monographs on Radiochemistry and Radiochemical Techniques

National Academy of Sciences—National Research Council

Energy Research and Development Administration. 7 by 10. Available from NTIS by appropriate NAS-NS number. Price schedule on page iii.

A series of monographs concerned with the areas of nuclear science that involve the chemist. Designed to be of maximum use to the working scientist, each monograph presents pertinent information for radiochemical work with an individual element or with a specialized technique. These publications are valuable not only to radiochemists but also to research workers in other fields, such as physics, biochemistry, or medicine, who wish to use radiochemical techniques to solve specific problems.

Elements

Aluminum and Gallium, NAS-NS-3032 [1961], 52 pp.
Americium and Curium, NAS-NS-3006 [1960], 66 pp.
Antimony, NAS-NS-3033 [1961], 59 pp.
Arsenic, NAS-NS-3002 (Rev.) [1965], 4 pp.
Astatine, NAS-NS-3012 [1960], 33 pp.
Barium, Calcium, and Strontium, NAS-NS-3010 [1960], 123 pp.
Beryllium, NAS-NS-3013 [1960], 58 pp.
Cadmium, NAS-NS-3001 [1960], 61 pp.
Carbon, Nitrogen, and Oxygen, NAS-NS-3019 [1960], 24 pp.
Cesium, NAS-NS-3035 [1961], 73 pp.
Chromium, NAS-NS-3007 (Rev.) [1963], 64 pp.
Cobalt, NAS-NS-3041 [1961], 95 pp.
Copper, NAS-NS-3027 [1961], 59 pp.
Fluorine, Chlorine, Bromine, and Iodine, NAS-NS-3005 [1960], 46 pp.
Francium, NAS-NS-3003 [1960], 38 pp.
Germanium, NAS-NS-3043 [1961], 54 pp.
Gold, NAS-NS-3036 [1961], 38 pp.
Indium, NAS-NS-3014 [1960], 51 pp.
Iridium, NAS-NS-3045 [1961], 35 pp.
Iron, NAS-NS-3017 [1960], 146 pp.
Lead, NAS-NS-3040 [1961], 164 pp.
Magnesium, NAS-NS-3024 [1961], 28 pp.
Manganese, NAS-NS-3018 (Rev.) [1971], 67 pp.
Mercury, NAS-NS-3026 (Rev.) [1970], 202 pp.
Molybdenum, NAS-NS-3009 [1960], 42 pp.
Neptunium, NAS-NS-3060 [1974], 234 pp.
Nickel, NAS-NS-3051 [1961], 126 pp.

Niobium and Tantalum, NAS-NS-3039 [1961], 62 pp.
Osmium, NAS-NS-3046 [1961], 20 pp.
Palladium, NAS-NS-3052 [1961], 117 pp.
Phosphorus, NAS-NS-3056 [1962], 36 pp.
Platinum, NAS-NS-3044 [1961], 33 pp.
Plutonium, NAS-NS-3058 [1965], 192 pp.
Polonium, NAS-NS-3037 [1961], 73 pp.
Potassium, NAS-NS-3048 [1961], 50 pp.
Protactinium, NAS-NS-3016 [1959], 80 pp.
Radium, NAS-NS-3057 [1964], 212 pp.
Rare Earths—Scandium, Yttrium, and Actinium, NAS-NS-3020 [1961], 282 pp.
Rare Gases, NAS-NS-3025 [1960], 59 pp.
Recent Radiochemical Separation Procedures for As, At, Be, Mg, Ni, Ru, and Se, NAS-NS-3059 [1974], 91 pp.
Rhenium, NAS-NS-3028 [1961], 48 pp.
Rhodium, NAS-NS-3008 (Rev.) [1965], 82 pp.
Rubidium, NAS-NS-3053 [1962], 91 pp.
Ruthenium, NAS-NS-3029 [1961], 84 pp.
Selenium, NAS-NS-3030 (Rev.) [1965], 55 pp.
Silicon, NAS-NS-3049 (Rev.) [1968], 81 pp.
Silver, NAS-NS-3047 [1961], 59 pp.
Sodium, NAS-NS-3055 [1962], 48 pp.
Sulfur, NAS-NS-3054 [1961], 89 pp.
Technetium, NAS-NS-3021 [1960], 58 pp.
Tellurium, NAS-NS-3038 [1960], 46 pp.
Thorium, NAS-NS-3004 [1960], 73 pp.
Tin, NAS-NS-3023 [1960], 74 pp.
Titanium, NAS-NS-3034 (Rev.) [1971], 91 pp.
Transcurium Elements, NAS-NS-3031 [1960], 39 pp.
Tungsten, NAS-NS-3042 [1961], 45 pp.
Uranium, NAS-NS-3050 [1962], 355 pp.
Vanadium, NAS-NS-3022 [1960], 80 pp.
Zinc, NAS-NS-3015 [1960], 58 pp.
Zirconium and Hafnium, NAS-NS-3011 [1960], 56 pp.

Techniques

Absolute Measurements of Alpha Emission and Spontaneous Fission, NAS-NS-3112 [1968], 67 pp.
Activation Analysis with Charged Particles, NAS-NS-3110 [1966], 47 pp.
Application of Distillation Techniques to Radiochemical Separations, NAS-NS-3108 [1962], 44 pp.
Applications of Computers to Nuclear and Radiochemistry, NAS-NS-3107 [1962], 321 pp.
Cation-Exchange Techniques in Radiochemistry, NAS-NS-3113 [1971], 195 pp.
Chemical Yield Determinations in Radiochemistry, NAS-NS-3111 [1967], 101 pp.
Detection and Measurement of Nuclear Radiation, NAS-NS-3105 [1961], 144 pp.
Liquid–Liquid Extraction with High-Molecular-Weight Amines, NAS-NS-3101 [1960], 86 pp.
Low-Level Radiochemical Separations, NAS-NS-3103 [1961], 38 pp.
Neutron Activation Techniques for the Measurement of Trace Metals in Environmental Samples, NAS-NS-3114 [1974], 86 pp.
Paper Chromatographic and Electromigration Techniques in Radiochemistry, NAS-NS-3106 [1962], 53 pp.
Processing of Counting Data, NAS-NS-3109 [1965], 167 pp.
Rapid Radiochemical Separations, NAS-NS-3104 [1961], 130 pp.
Separations by Solvent Extraction with Tri-*n*-octylphosphine Oxide, NAS-NS-3102 [1961], 60 pp.
Users' Guides to Radioactivity Standards, NAS-NS-3115 [1974], 90 pp.

Physical Properties and Analysis of Heavy Water

(National Nuclear Energy Series, Division III, Volume 4A)

Isidor Kirshenbaum, Esso Laboratories, Standard Oil Development Company

McGraw-Hill, 1951. 438 pp., 6 by 9. Available from University Microfilms as OP797: Xerographic copy, paper binding, $51.80. Microfilm (35 mm), $17.30. Also available from Microforms International: Microfilm (16 mm), $15.50.

A discussion of the physical properties of heavy water, chemical equilibrium or exchange reactions, various methods of isotopic analysis, and natural abundance of hydrogen and oxygen isotopes.

Polonium

(National Nuclear Energy Series, Division VII, Volume 3)

Editor: Harvey V. Moyer, Ohio State University

U. S. Atomic Energy Commission, 1956. 392 pp., 6 by 9. Available from University Microfilms as OP6233: Xerographic copy, paper binding, $46.80. Microfilm (35 mm), $15.60. Also available from Microforms International: Microfilm (16 mm), $14.00.

presentation of the results of research at Mound Laboratory on the nuclear, physical, and chemical properties of polonium; extraction of polonium from lead residues; separation by chemical methods and by distillation of polonium from irradiated bismuth; protection of personnel from radiological hazards; and waste disposal.

Preparation, Properties, and Technology of Fluorine and Organic Fluoro Compounds

(National Nuclear Energy Series, Division VII, Volume 1)

Editors: Charles Slesser and Stuart R. Schram, New York Operations Office, U. S. Atomic Energy Commission

McGraw-Hill, 1951. 868 pp., 6 by 9. Available from University Microfilms as OP16830: Xerographic copy, paper binding, $101.70. Microfilm (35 mm), $33.90.
Also available from Microforms International: Microfilm (16 mm), $30.50.

A description of how organic fluoro compounds of various types were prepared in the laboratory, how their physical and chemical properties were studied, and how they were rapidly brought to industrial-scale production.

Production of Heavy Water

(National Nuclear Energy Series, Division III, Volume 4F)

Editors: George M. Murphy, Washington Square College, New York University; Harold C. Urey, Institute for Nuclear Studies, University of Chicago; and Isidor Kirshenbaum, Esso Laboratories, Standard Oil Development Company

McGraw-Hill, 1955. 394 pp., 6 by 9. Available from University Microfilms as OP13866: Xerographic copy, paper binding, $47.00. Microfilm (35 mm), $15.70.
Also available from Microforms International: Microfilm (16 mm), $14.00.

A survey of heavy-water plants and their operation and a description of the results of pilot-plant studies on development processes.

Promethium Technology

(American Nuclear Society—U. S. Atomic Energy Commission Monograph)

Editor: E. J. Wheelwright, Pacific Northwest Laboratory

American Nuclear Society, 1973. 395 pp., 6 by 9, $22.50.
LC 73-87386

A summary of the research that has been done on promethium and its compounds. Since some of the work is not published and much of the published material is available only in USAEC documents, the chapters of vital interest to the scientist or engineer using promethium are written in considerable detail. Each chapter is prefaced with a brief summary statement and an outline of the chapter contents.

CONTENTS: Early developments in promethium chemistry. Recovery and purification of promethium. Formation and nuclear properties. Dose rate and shielding calculations for promethium metal and oxide sources. Improvement of the radiation characteristics. Promethium from power reactors. Promethium biological considerations. Practical radiation protection considerations. Analytical chemistry of promethium. Preparation and properties of promethium oxide. Preparation and properties of promethium metal. Containment of Pm_2O_3 and promethium metal at elevated temperatures. Densification of promethium sesquioxide. Fabrication of promethium sources. Promethium applications review. Author and subject indexes.

Pulse Radiolysis

(American Chemical Society—U. S. Atomic Energy Commission Monograph)

Max S. Matheson, Argonne National Laboratory, and Leon M. Dorfman, Ohio State University

American Chemical Society, 1975 (facsimile of the MIT Press 1969 edition). 202 pp., 6 by 9. Library binding, $14.75. Paper binding, $8.50.
LC 74-25019 ISBN 0-8412-0230-3

An integration of the two aspects of pulse radiolysis—its application in radiation chemistry and its usefulness in chemical kinetics. The various reactions of short-lived intermediates are studied, and a broad variety of transient intermediates, as well as metal ions of unstable valency, are discussed.

Radiation Effects on Organic Materials

Editors: Robert O. Bolt and James G. Carroll, California Research Corporation
Academic Press, 1963. 576 pp., 6 by 9. Available from University Microfilms as OP50867. Xerographic copy, paper binding, $67.80. Microfilm, $22.60.
LC 62-21141

A book that covers the effect of radiation on organics. It is useful to both the radiation-effects experimenter and the designer. Theory is not detailed but is adequate so that one can reasonably predict the nature and amount of radiation effects on a certain type of material. Numerous tables and charts are included.

Radiochemical Studies: The Fission Products

(National Nuclear Energy Series, Division IV, Volume 9; in three volumes)
Editors: Charles D. Coryell, Laboratory for Nuclear Science and Engineering, Massachusetts Institute of Technology, and Nathan Sugarman, Institute for Nuclear Studies, University of Chicago
McGraw-Hill, 1951. 2086 pp., 6 by 9. Available from University Microfilms as OP4944 BK1P1-4 for Vol. 1, OP4944 BK2P5 for Vol. 2, and OP4944 BK3P5-8 for Vol. 3. Xerographic copy, paper binding: Vol. 1, $62.30; Vol. 2, $93.00; Vol. 3, $90.30. Microfilm (35 mm): Vol. 1, $20.80; Vol. 2, $31.00; Vol. 3, $30.10. Also available from Microforms International: Microfilm (16 mm), $73.00 per set of three volumes on two reels.

A presentation of the results of research completed at Ames, Chicago, Oak Ridge, Berkeley, Bloomington, Hanford, and Los Alamos.

Scandium: Its Occurrence, Chemistry, Physics, Metallurgy, Biology and Technology

C. T. Horovitz, Institut für Siedlungswasserbau, Universität Stuttgart; K. A. Gschneidner, Jr., Ames Laboratory, Iowa State University; G. A. Melson, Department of Chemistry, Michigan State University; D. H. Youngblood, Cyclotron Institute, Texas A and M University; and H. H. Schock, Mineralogisches Institut, Universität Tübingen
Editor: C. T. Horovitz
Academic Press, 1975. 614 pp., 6 by 9, $42.25.
LC 74-5646 ISBN 0-12-355850-6

A book providing a comprehensive review of all aspects of scandium as a model for one of the elements of nature by describing its cosmic origin and occurrence in nature; chemical, physical, and technological properties; biological significance, toxic effects; and applications. The volume brings together important research developments and original data from various sources and will have great value as a reference work where a critical analysis of published literature has been made. It will benefit specialists in a wide variety of fields.

CONTENTS: Discovery and history. Distribution in nature. Geochemistry and mineralogy. Derivation, extraction, and preparation. Physical metallurgy. Chemical properties. Scandium isotopes. Inorganic compounds. Alloys and intermetallic compounds. Organic compounds. Analytical chemistry. Technology, applications, and economy. Occurrence in living systems. Biological significance. Toxicology. Author and subject indexes.

Selected Measurement Methods for Plutonium and Uranium in the Nuclear Fuel Cycle

(Second edition)
Editor: Clement J. Rodden, formerly of New Brunswick Laboratory, U. S. Atomic Energy Commission
U. S. Atomic Energy Commission, 1972. 440 pp., 6 by 9. Available from NTIS as TID-7029(2nd ed.). Paper copy, $6.00. Microfiche, $3.00.
LC 72-600015

A revised edition of an earlier publication, necessitated by improvements in measurement methods. This edition indicates methods of analysis for materials starting with the product material used in the preparation of nuclear fuels and continuing through the products obtained from the recovery of fissionable materials from irradiated fuels. Included are methods of analysis for uranium and its isotopes in product material used in manufacturing nuclear fuels; in alloys, ceramics, and cermets; in plutonium–uranium fuels; and in dissolver solutions from fuel-fabrication scrap. Similar methods are given for plutonium. In addition,

methods for uranium and plutonium obtained by dissolving expanded reactor fuels are considered.
CONTENTS: Part I: General Considerations. Introduction. Standard reference materials. Sampling. Bulk measurements. Part II: Analytical Methods. Uranium-bearing material. Plutonium-bearing material. Hot process solutions. Apparatus and reagents. Index.

Spectrometry of Fuels

Editor: R. A. Friedel, Bureau of Mines
Plenum, 1970. 343 pp., 6 by 9, $32.50.
LC 70-112726 ISBN 306-30442-2
Spectrometric investigation of fuels and related materials. This book deals primarily with original research into the composition, structure, and efficient pollution-free utilization of coal and petroleum and explores the possibilities of alternate fuel sources.

Spectroscopic Properties of Uranium Compounds

(National Nuclear Energy Series, Division III, Volume 2)
G. H. Dieke, The Johns Hopkins University, and A. B. F. Duncan, University of Rochester
McGraw-Hill, 1949. 290 pp., 6 by 9. Available from University Microfilms as
OP10890: Xerographic copy, paper binding, $35.20. Microfilm (35 mm), $11.80.
Also available from Microforms International: Microfilm (16 mm), $10.75.
A discussion of the spectra and the preparation of a number of uranium compounds.

The Transuranium Elements: Research Papers

(National Nuclear Energy Series, Division IV, Volume 14B; in two volumes)
Editors: Glenn T. Seaborg, University of California, and Joseph J. Katz and Winston M. Manning, Argonne National Laboratory
McGraw-Hill, 1949. 1733 pp., 6 by 9. Available from University Microfilms as OP13864 V14P1 for Part I and OP13864 V14P2 for Part II. Xerographic copy, paper binding: Part I, $102.10; Part II, $100.90. Microfilm (35 mm): Part I, $34.10; Part II, $33.70. Also available from Microforms International: Microfilm (16 mm), $61.00 per set of two volumes on two reels.
The findings of research on four known transuranium elements: neptunium, plutonium, americium, and curium. Several papers concerning radium, actinium, thorium, protactinium, and uranium are also included.

Uranium Ore Processing

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)
Editors: J. W. Clegg and D. D. Foley, Battelle Memorial Institute
Addison-Wesley, 1958. 436 pp., 6 by 9. Available from University Microfilms as
OP17586. Xerographic copy, paper binding, $22.15. Microfilm, $7.40.
LC 58-12597
A condensed but essentially complete description of practices used in extracting uranium from its ores. Although the emphasis is on a well-rounded presentation of practices in the United States, techniques in other countries are also described. Comprehensive and authoritative, the volume should be helpful to all workers in the field. Various processes are described in full, and many observations are included. Each chapter contains an extensive reference list.

RECENT PUBLISHED SYMPOSIUM FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

Decontamination and Decommissioning of ERDA Facilities, Conference on
Idaho Falls, Idaho, Aug. 19, 1975. Sponsored by Energy Research and Development Administration and Aerojet Nuclear Company. 1975. 521 pp. Available from NTIS as CONF-750827.

RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Direct Methods of Crystal Structure Analysis
Mound Laboratory. Jan. 31, 1974. 162 pp. Available from NTIS as MLM-1987.

Electron Spectroscopy for Chemical Analysis (ESCA)
Mound Laboratory. January 1974. 58 pp. Available from NTIS as MLM-2022.

Mass Spectroscopy Literature Compiled by a Computer Method
Ames Laboratory.
A Bibliography up to and Including 1972
Volume 1: Bibliography and Author Index. August 1975. 483 pp. Available from NTIS as IS-3558 (Vol. 1).
Volume 2: Key Word out of Context (KWOC) Index. August 1975. 986 pp. Available from NTIS as IS-3558 (Vol. 2).
A Bibliography up to and Including 1973, with Author Index
June 1976. 832 pp. Available from NTIS as IS-3830.

Radioactive Waste Management
Bibliographies of Publicly Available Literature
Pertaining to the USAEC's Hanford, Washington, Production Site
USAEC Technical Information Center. August 1973. 157 pp. Available from ERDA Technical Information Center as TID-3340. Free.
Pertaining to the USAEC's National Reactor Testing Station, Idaho
USAEC Technical Information Center. August 1973. 56 pp. Available from ERDA Technical Information Center as TID-3342. Free.
Pertaining to the USAEC's Oak Ridge, Tenn., Site
USAEC Technical Information Center. September 1973. 89 pp. Available from ERDA Technical Information Center as TID-3343. Free.
Pertaining to the USAEC's Savannah River, S. C., Production Site
USAEC Technical Information Center. August 1973. 35 pp. Available from ERDA Technical Information Center as TID-3341. Free.

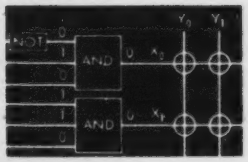
Radioactive Waste Processing and Disposal
ERDA Technical Information Center.
July 1975. 283 pp. Available from NTIS as TID-3311-S6.
August 1976. 305 pp. Available from NTIS as TID-3311-S7.
(Bibliographies on this subject from previous years are also available.)

Radium
USAEC Technical Information Center. May 1974. 635 pp. Available from NTIS as TID-3345.

Some Characteristics of Natural and Coal-Derived Humates: with Bibliography
ERDA Grand Forks Energy Research Center. June 1975. 69 pp. Available from NTIS as GFERC-IC-75-1.

Stable Isotopes of Xenon
Mound Laboratory. May 1975. 141 pp. Available from NTIS as MLM-2221.

Transplutonium Elements
USAEC Technical Information Center. January 1974. 215 pp. Available from NTIS as TID-3317-S4.
ERDA Technical Information Center. September 1975. 161 pp. Available from NTIS as TID-3317-S5.
ERDA Technical Information Center. November 1975. 232 pp. Available from NTIS as TID-3317-S6.
ERDA Technical Information Center. January 1977. 144 pp. Available from NTIS as TID-3317-S7.



COMPUTERS AND MATHEMATICS

Basic Principles of the Tracer Method: Introduction to Mathematical Tracer Kinetics

C. W. Sheppard, University of Tennessee Medical Units, Memphis, Tennessee
John Wiley & Sons, 1962. 282 pp., 6 by 9. Available from University
Microfilms as OP65747. Xerographic copy, paper binding, $34.20. Microfilm, $11.40.

A book dealing with ways to obtain meaningful information from experimental results rather than how to perform tracer experiments. The author discusses results that may be expected after a tracer is introduced into some portion of a system. He considers current methods of applied mathematics, including numerical analysis with digital computers and analog simulation procedures, and indicates possible applications in chemistry, physics, and physiology. Since basic physical principles are investigated, the mathematical tools of physics are used, but, because of the special needs of the biologist, the mathematics is not rigorous. A reference section is included.

Computer Graphics: 118 Computer-Generated Designs

Melvin L. Prueitt, Los Alamos Scientific Laboratory
Dover Publications, 1975. 72 pp., 8 by 11, $2.00.
LC 74-18611 ISBN 0-486-23178-X

A computer program constituting a fast algorithm for plotting arrays of numbers in perspective with hidden lines removed. PICTURE, the computer program, is designed primarily to display mathematical functions and experimental data. Once an array of numbers has been delivered to the program and a viewpoint specified, the program, in the framework of the computer, performs rotation, projection, and hidden-line removal. Nothing resembling an image is developed until the numbers, in the form of electronic pulses, reach a plotting device. Most of the designs in this book resulted from the deliberate intention to create a particular form, but some were surprises in which the result did not match the intent and a few were errors.

CONTENTS: Visual representations (118 designs) of sets of numbers, including plots of experimental data, arrays displayed in different ways or with different viewing angles in sequential figures, and below-the-surface viewpoints to give the observer a look at features that may be hidden when viewed from above.

Computer Solution of Ordinary Differential Equations: The Initial Value Problem

L. F. Shampine and M. K. Gordon, Sandia Laboratories and University of New Mexico

W. H. Freeman and Co., 1975. 318 pp., 6 by 9, $13.95.
LC 74-23246 (CIP) ISBN 0-7167-0461-7

A text that shows how to solve differential equations on a digital computer. It also shows how the numerical analyst must blend abstract theory, analysis of special situations and model problems, heuristics, and careful experimentation to produce effective codes. One intended use as a textbook is for a topics course in numerical analysis. Another use is as a supplementary text to cover the solution of differential equations by digital computer for a survey course on numerical analysis. The computer codes described in the book are available on magnetic tape or punched cards at cost from the Argonne Code Center, Argonne National Laboratory, Argonne, Ill.

CONTENTS: Fundamentals of the theory. Interpolation theory. Adams formulas. Convergence and stability—small step sizes. Efficient implementation of the Adams methods. Error estimation and control. Order and step size selection. Stability—large step sizes. Computer arithmetic. The codes. Code performance and evaluation. Techniques, examples, and exercises. Solutions to the exercises. Appendix: Notation and some theorems from the calculus. References. Index.

Computer Systems in the Library: A Handbook for Managers and Designers

Stanley J. Swihart, Silver Star Companies, and Beryl F. Hefley, Sandia Laboratories
Melville Publishing Co., 1973. 487 pp., 6 by 9. Available from John Wiley & Sons, $19.25.
LC 73-603 (CIP) ISBN 0-471-83995-7

A handbook designed to suggest how automation can improve library services and how to make the change from manual to automated systems. In largely nontechnical language, the authors discuss the areas of library activities that can successfully be automated, major design considerations, methods of implementing the systems, and methods of converting from a manual to an automated system. Although no computer programs are included, extensive detail is provided as to forms layout, file content, coding structures, and other technical data. A volume in the Hayes and Becker Information Science Series.

CONTENTS: Introduction. Why automate? Catalog publication. Circulation. Acquisitions. Cataloging. Catalog reference services. Serials. Cataloging standards. Interlibrary exchanges. Planning an automation program. Hardware, software, and operations. Appendixes: a key-word exclusion list; model key-punch rules; selected bibliography for further reading. Index.

Elements of Combinatorial Computing

Mark Wells, Los Alamos Scientific Laboratory
Pergamon Press, 1971. 258 pp., 7 by 9, $13.75.
LC 77-129633 ISBN 0-08-016091-3

A book that brings together under one cover the basic and important computer methods of solving problems that involve the handling of combinatorial entities (more generally, of finite sets). To assist the reader in gaining facility for constructing combinatorial algorithms of his own design, the author has given special attention to the structure of the algorithm, why algorithms work, and how they can be altered to accomplish similar but distinct tasks. Algorithms are presented in a language specifically designed for combinatorial computing. The two underlying goals of the book are to introduce the pure mathematician to the possibilities of high-speed computation and to point out to the computer scientist some of the needs of the research mathematician. Therefore this book is intended primarily for mathematically trained individuals interested in the use of high-speed digital computers for obtaining "answers" (counter-examples and heuristic data perhaps more than final results) to combinatorial problems. Beyond basic mathematical training, the book presupposes only a grasp of the concept of algorithmic computing. Exercises at the end of each major section are considered an integral part of the text.

Essentials of Padé Approximants

George A. Baker, Jr., Brookhaven National Laboratory and Baker Laboratory, Cornell University
Academic Press, 1975. 512 pp., 6 by 9. Library edition (with 20 x microfiche), $34.00.
Regular edition, $28.50.
LC 74-1632 (CIP) ISBN 0-12-074855

A unified account of current knowledge of Padé approximants. This book assembles the material of several major areas. In addition to classic material on the algebraic properties and

the convergence theory, the book gives special attention to some widely occurring classes of functions for which not only convergence, but converging upper and lower bounds, can be obtained. The volume will be of interest to theoretical physicists, mathematicians, theoretical chemists, and electrical engineers. The technical content of the book is such that it should be readable by an advanced undergraduate in mathematics or a graduate student in theoretical physics, chemistry, or engineering, the main prerequisite being a course in functions of a complex variable.

CONTENTS: Part I: Algebraic Properties. Introduction. The structure of the Padé table. Identities. Relation between Padé approximants and continued fractions. Gauss's hypergeometric function. Recursion relations. Relation between orthogonal polynomials and Padé approximants. The N-point Padé approximant. Invariance properties. Part II: Convergence Theory. Numerical examples. Convergence of vertical and horizontal sequences. Convergence of general sequences. The distribution of poles and zeros. Convergence in Hausdorff measure. Part III: Series of Stieltjes and Pólya. Series of Stieltjes, inequalities. Series of Stieltjes, convergence. Series of Stieltjes, inclusion regions. Pólya frequency series. Part IV: Generalizations and Applications. Generalized Padé approximants. Series with infinite coefficients. Matrix Padé approximants. Critical phenomena. Scattering physics. Electrical circuits and several other applications. References. Index.

Finite Operator Calculus

Gian-Carlo Rota, Massachusetts Institute of Technology, with the collaboration of P. Doubilet, C. Greene, D. Kahaner, A. Odlyzko, and R. Stanley

Academic Press, 1975. 169 pp. 6 by 9, $9.75.

LC 75-30776 (CIP) ISBN 0-12-596650-4

A collection of papers serving as an introduction and a guide to combinatorics. It shows how a classical problem in enumeration is solved by using linear functions on a vector space. Formal aspects of the calculus of finite differences are systematically developed. Obtaining "calculi" more suitable for some combinatorial problems from reduced incidence algebra other than that of a Boolean algebra is considered. The valuation ring of a distributive lattice is introduced and is related to Möbius algebra.

CONTENTS: Introduction. The number of partitions of a set. Finite operator calculus. The idea of generating function. The valuation ring. Valuation ring and Möbius algebra.

Handbook of Statistical Tables

D. B. Owen, Sandia Corporation

Addison-Wesley, 1962. 592 pp., 6 by 9. Available from University Microfilms as PB2185. Xerographic copy, paper binding, $67.50. Microfilm, $22.50.

LC 61-10972

A compilation of statistical tables designed to be inclusive enough to be used as a supplementary handbook for most courses in statistics and to contain as many as possible of the unusual tables of merit that are not given in other compilations now on the market. This book was intended for three audiences: the student in statistics who needs some readily accessible tables to be used in conjunction with his courses in statistics, the practicing statistician, quality-control man, or industrial engineer who wants a set of tables from which he can obtain answers with a minimum of interpolation and other calculation; and the research worker who will find in this collection many functions more extensively tabulated than ever before.

Interactive Bibliographic Systems

(AEC Symposium Series)

Chairman: Charles T. Meadow, U. S. Atomic Energy Commission.

Proceedings Editor: Madeline B. Henderson, National Bureau of Standards

U. S. Atomic Energy Commission, 1973. 211 pp., 6 by 9. Available from NTIS as CONF-711010. Paper copy, $7.60. Microfiche, $3.00.

LC 73-600098

Proceedings of a symposium held in Gaithersburg, Md., Oct. 4–5, 1971, jointly sponsored by the Committee on Scientific and Technical Information, Federal Council for Science and Technology, Federal Library Committee, U. S. Atomic Energy Commission, and National Bureau of Standards. The purpose of this forum was to bring together a diverse group of federal government users and designers of interactive computer systems to discuss common experiences, problems, and plans. Papers and discussions center around the following areas. User interface: the problems of man–machine interface, the tools and techniques available

to designers, and the reactions of users. System configuration: a discussion of the major components of interactive systems; such as file organization, communications facilities, and software. Economics and performance: cost factors in system development, hardware and software variables affecting performance, and user evaluation of systems. Future developments: a projection of current systems from their initial promise to future full utility both to management and to individual users.
CONTENTS: Four main subject areas: User interface (5 papers). Systems configuration (5 papers). Economics and performance (3 papers). Future developments (4 papers). Paper discussions. Three open discussions. Index.

An Introduction to Invariant Imbedding

R. Bellman, University of Southern California, Los Angeles, and
G. M. Wing, Los Alamos, New Mexico
John Wiley & Sons, 1975. 250 pp., 6 by 9, $20.00.
LC 74-18455 (CIP) ISBN 0-471-06416-5

A presentation focusing on the methodology itself rather than on the particular physical problems to which it can be applied. The first three chapters build up a background of invariant imbedding methods. The other chapters apply the invariant imbedding method to specific areas, to questions that are often of considerable direct interest to the engineer, physicist, applied mathematician, numerical analyst, and others. After mastery of the first three chapters, the reader can select the specific subjects that interest him in later chapters without reading all the intervening material. A large set of problems, ranging from the simple to the complicated, is included at the end of each chapter.
CONTENTS: Fundamental concepts. Additional illustrations of the invariant imbedding method. Functional equations and related matters. Existence, uniqueness, and conservation relations. Random walk. Wave propagation. Time dependent problems. The calculation of eigenvalues for Sturm–Liouville type systems. Schrodinger-like equations. Applications to equations with periodic coefficients. Transport theory and radiative transfer. Integral equations. Author and subject indexes.

Introduction to Nonlinear Differential and Integral Equations

Harold T. Davis, Northwestern University
U. S. Atomic Energy Commission, 1960. 566 pp., 6 by 9. Available from
Dover Publications, $5.50.
ISBN 0-486-60971-5

A presentation of a general survey of the problem presented by nonlinear equations; classical theories of integration, the integrating factor, particular equations, and the problem of singular solutions; critical examination of existence theorems and the algorithms they contain; and Volterra's theory of the growth of conflicting populations and the problem of pursuit. Also included is a discussion of a number of classical equations and their solutions.

Invariant Imbedding and Its Applications to Ordinary Differential Equations: An Introduction

Melvin R. Scott, Sandia Laboratories
Addison-Wesley, 1973. 215 pp., 6 by 9. Library binding, $19.50. Paper binding, $11.50.
LC 73-4792 (CIP) ISBN 0-201-06844-3 (library binding)
ISBN 0-201-06845-1 (paper binding)

A monograph that applies the method of invariant imbedding to the numerical solution of ordinary differential equations, with primary emphasis on homogeneous and inhomogeneous linear boundary-value problems. This volume should be of special interest to engineers, physicists, and applied mathematicians. The level of the presentation has been designed for use as a supplementary text in numerical analysis or ordinary differential equations, and a large number of exercise and numerical examples have been included for tutorial purposes. Many numerical examples are used to compare this method with other techniques. Volume 1 in the Addison-Wesley Applied Mathematics and Computation Series.
CONTENTS: Review of ordinary differential equations. Review of numerical solution of ordinary differential equations. Introduction to invariant imbedding. Linear boundary-value problems—inhomogeneous. Linear boundary-value problems—homogeneous. Linear boundary-value problems—inhomogeneous equations revisited. Linear initial-value problems. Systems of equations. Nonlinear boundary-value problems. Author and subject indexes.

Lecture Notes in Mathematics: Eigenfunction Branches of Nonlinear Operators, and Their Bifurcations

George H. Pimbley, Jr., Los Alamos Scientific Laboratory
Springer-Verlag, 1969. 128 pp., 6 by 10, $7.40 in United States.
LC 70-97958 ISBN 0-387-04623-2

A collection of informal reports and seminars. These lecture notes cover a series of lectures on nonlinear operators given at Battelle Memorial Advanced Study Center in Geneva, Switzerland, June 27 to Aug. 5, 1968. The entire lecture series has to do with the eigenvalue problem $\lambda x = T(x)$, where $T(x)$ is a bounded nonlinear operator.

Matrix Eigensystem Routines—EISPACK Guide

(Second edition)
B. T. Smith, J. M. Boyle, J. J. Dongarra, B. S. Garbow, Y. Ikebe, V. C. Klema, and C. B. Moler
Springer-Verlag, 1976. 551 pp., 7 by 10, $17.30.
LC 76-2662 (CIP) ISBN 0-387-07546-1

A manual presenting the package of Fortran IV programs with the acronym EISPACK, which is a systematized collection of subroutines that compute the eigenvalues and/or eigenvectors of six classes of matrices: complex general, complex Hermitian, real general, real symmetric, real symmetric tridiagonal, and special real tridiagonal matrices. The subroutines are based mainly on Algol procedures. A user guide to EISPACK and to a control program EISPAC, the book includes program segments that illustrate each of the basic computations with EISPACK and discusses variants of these that provide mild trade-offs of efficiency, storage, and accuracy. Volume 6 in the Lecture Notes in Computer Science series.

CONTENTS: Introduction. How to use EISPACK. Validation of EISPACK. Execution times for EISPACK. Certification and availability of EISPACK. Differences between the EISPACK subroutines and the handbook Algol procedures. Documentation and source listings.

Nonlinear Two Point Boundary Value Problems

Paul B. Bailey, Lawrence F. Shampine, and Paul E. Waltman, Sandia Corporation
Academic Press, 1968. 171 pp., 6 by 9, $16.50.
LC 68-18656 ISBN 0-12-073350-1

A well-illustrated look at the ideas and methods helpful in the study of nonlinear boundary value problems for differential equations of the second order. The kinds of equations and the level of treatment are those common to introductory courses.

Particle Accelerator Design Computer Programs

John S. Colonias, Lawrence Berkeley Laboratory
Academic Press, 1974. 320 pp., 6 by 9, $27.50.

A concise account of some of the most important computer programs applicable to accelerator design. The presentation is intended to serve a twofold purpose: first, to assemble under one cover all these programs and, second, to present the research worker, physicist, or engineer with the information by which he can determine the program's effective use. The programs reflect what the author thinks is necessary for a generalized discussion and include mathematical development of programs, operating procedures, program organization, and application techniques. This book is concerned primarily with the description of these programs rather than with a comprehensive and exhaustive treatment of theoretical details.

CONTENTS: Part A: Programs for Magnetic and Electric Fields. Two-dimensional magnetostatic programs. Calculation of electrostatic fields. Three-dimensional magnetostatic programs. Part B: Orbit Calculation Programs. Programs employing matrix formalism. Programs employing integration for equations of motion. Part C: Linear Accelerator Programs. Programs for Linac cavities. Appendixes: summary of computer programs that solve the nonlinear partial differential equation for magnetostatics in 2 dimensions; summary of computer programs that solve the partial differential equations for magnetostatics in 3 dimensions; summary of computer programs that use the integral equation method. References. Author and subject indexes.

Sets, Numbers, and Universes: Selected Works of Stanislaw Ulam

Editors: W. A. Beyer, J. Mycielski, and G.-C. Rota
MIT Press, 1974. 709 pp., 7 by 10, $25.00.
LC 73-21680 (CIP) ISBN 0-262-02108-0

A collection of Stanislaw Ulam's major papers in pure mathematics and his studies of the applications of computers to nonlinear computation in game theory and physics. A mathematician with unusually broad interests and career, Ulam has contributed to the areas of pure and applied mathematics, technology, computation, physics, astronomy, and biology. In addition to direct contributions to these fields, he has posed concise problems whose solutions or attempts at solution have advanced these fields. Some of these problems are discussed in his book "A Collection of Mathematical Problems," which is included in this volume. The commentaries by other mathematicians given at the end of this volume attest to Ulam's impact on the development of mathematics and other sciences. A volume in the Mathematicians of Our Time series.

CONTENTS: Bibliography of Stanislaw Ulam. Commentators. Part I: Mathematics (38 papers: 20 in English, 10 in French, and 8 in German). Part II: Computations, Games, and Numbers (14 papers in English). Part III: Mathematical Problems: A Collection of Mathematical Problems (in English). Commentaries: commentaries to Part I; commentaries to Part II; bibliography for the commentaries.

Statistical Methods in Nuclear Material Control

John L. Jaech, Exxon Nuclear Company
U. S. Atomic Energy Commission, 1973. 409 pp., 6 by 9. Available from NTIS as TID-26298. Paper copy, $10.60. Microfiche, $3.00.
LC 73-600241

A volume bringing together in one publication selected statistical techniques applicable to nuclear industry safeguards applications, including some approaches that are not well known. Intended as a personal reference book to be studied by the individual reader, the text places heavy emphasis on worked examples, usually with sufficient calculational details to enable the reader to follow the solution step by step. The organization of the material allows the reader interested solely in a particular application to choose only problems in his sphere of interest and permits the reader interested only in applications to omit sections dealing with the statistical bases for the solution.

CONTENTS: Introduction. Probability and statistics. Sources of uncertainty in nuclear materials control. Mean and variance of functions of random variables. Limits of error on individual items. Limits of error for general algebraic sums. Interpretation of MUF and LE–MUF. Analysis of paired data. Inventory verification. Integrated applications. Appendixes A to G: statistical tables. Index.

Use of Computers in Analysis of Experimental Data and the Control of Nuclear Facilities

(AEC Symposium Series)
Coordinator: Bernard I. Spinrad, Argonne National Laboratory
U. S. Atomic Energy Commission, 1967. 306 pp., 6 by 9. Available from NTIS as CONF-660527. Paper copy, $6.00. Microfiche, $3.00.
LC 67-60057

Proceedings of a symposium held at Argonne National Laboratory, May 4–6, 1966, sponsored by the Argonne National Laboratory and the U. S. Atomic Energy Commission. The symposium is addressed primarily to disciplines that are not well computerized, to encourage computer use in these fields, and also to areas with little computer use within high-computer-use disciplines.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

CUBE Symposium
Livermore, Calif. October 23–25, 1974. Sponsored by Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, Los Alamos Scientific Laboratory, and Sandia Laboratories, Albuquerque and Livermore. 1974. 582 pp. Available from NTIS as CONF-741001.

First ERDA Statistical Symposium, Proceedings of the
Los Alamos, N. M. Nov. 3–5, 1975. Sponsored by Energy Research and Development Administration. 1976. 220 pp. Available from NTIS as BNWL-1986.

Information Processing in Scintigraphy
Proceedings of the Third International Conference on Data Handling and Image Processing in Scintigraphy
Cambridge, Mass. June 6–9, 1973. Sponsored by National Science Foundation, U.S. Atomic Energy Commission, Digital Equipment Corp., Hewlett Packard, Inc., and Medical Data Systems, Inc. 1973. 209 pp. Available from NTIS as CONF-730687.

RECENT AND RELEVANT BIBLIOGRAPHIES

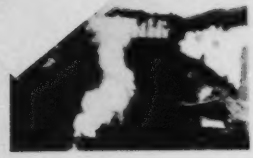
(For volumes available from NTIS, see price schedule on page iii.)

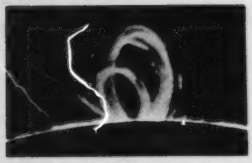
Argonne Code Center: Compilation of Program Abstracts
Argonne National Laboratory. April 1975. 430 pp. Available from NTIS as ANL-7411(Suppl. 9).

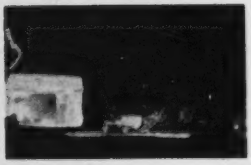
Computer Operating System Security, Bibliography on
Lawrence Livermore Laboratory. Apr. 15, 1974. 199 pp. Available from NTIS as UCRL-51555.

Computing Applications Department Cumulative Bibliography, 1962–1975
Oak Ridge National Laboratory. July 1976. 189 pp. Available from NTIS as K/CSD/INF/76/6.

Numerical Algebra, KWIC Index for
Oak Ridge National Laboratory. June 1975. 627 pp. Available from NTIS as ORNL-4778(Rev.).







ENERGY

Abundant Nuclear Energy

(AEC Symposium Series)

Coordinator: W. W. Grigorieff, Oak Ridge Associated Universities

U. S. Atomic Energy Commission, 1969. 352 pp., 6 by 9. Available from NTIS as CONF-680810. Paper copy, $6.00. Microfiche, $3.00.

LC 71-600642

Proceedings of a symposium held in Gatlinburg, Tenn., Aug. 26–29, 1968, sponsored by the Oak Ridge Associated Universities and the U. S. Atomic Energy Commission. This conference explores the applications of abundant low-cost nuclear energy with particular emphasis on industries and processes suitable for an agroindustrial complex, such as is envisioned for producing water and electricity in arid and semiarid areas. This book is of special value to those involved in nuclear research and development and to those responsible for educating the future nuclear engineers, scientists, and technicians.

A Conference on Capturing the Sun Through Bioconversion

Washington Center for Metropolitan Studies, 1976. 873 pp., 9 by 11, $18.00.

Proceedings of a symposium held in Washington, D. C., Mar. 10–12, 1976. The book reviews the bioconversion techniques by which solar energy can be stored in plant forms, recovered from organic wastes, and transformed into fuels, foods, and chemicals. Technical workshop discussions are summarized and follow the status reports to which they relate.

CONTENTS: Introduction. Broad conference statements (9 papers). Biomass sources (4 papers). Bioconversion processes and products (5 papers). Overall impacts (4 papers). Appendixes: responses to conference evaluation questionnaire; examples of bioconversion projects.

Direct Conversion of Nuclear Radiation Energy

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)

George H. Miley, University of Illinois

American Nuclear Society, 1971. 532 pp., 6 by 9, $34.90.

LC 70-155742

A comprehensive study of methods for converting nuclear radiation directly without using a heat cycle. The concepts discussed involve primarily the direct collection of charged particles released by radioisotopes and by nuclear and thermonuclear reactors. This

fossil plant risks, licensing requirements, nuclear insurance, nuclear industry safety record, and public attitudes.

CONTENTS: The potential hazard from radiation. Atomic power and the public interest. Significance of contributions of atomic energy. Atomic energy for society and the balance between hazard and gain. Explosion of some radiological myths. Effect of low-intensity radiation on man. Fact and fiction concerning nuclear power safety. Radiation in perspective—the role of nuclear energy in the control of air pollution. Radiation standards and public health. Radiation in perspective: some comparisons of the environmental risks from nuclear- and fossil-fueled power plants. Nuclear power in perspective: the plight of the benign giant. Nuclear liability insurance—a brief history reflecting the success of nuclear safety. Public opposition to nuclear power: an industry overview. Some effects of public intervention on the reactor licensing process. Natural radiation in the urban environment. The regulation of the environmental effects of nuclear power plants (parts I and II). Public health risks of thermal power plants. Health effects of electricity generation from coal, oil, and nuclear fuel. Index.

Nuclear Power, U.S.A.

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1964, presentation volume)

Walter H. Zinn, Combustion Engineering, Frank K. Pittman, U. S. Atomic Energy Commission, and John F. Hogerton, nuclear consultant

McGraw-Hill, 1964. 201 pp., 9 by 9. Available from University Microfilms as OP61593. Xerographic copy, paper binding, $24.60. Microfilm, $8.20. LC 64-23181.

An interpretive survey of U. S. progress in developing and applying nuclear power, particularly for producing electricity.

Nuclear Propulsion for Merchant Ships

A. W. Kramer, editor of *Atomics*

U. S. Atomic Energy Commission, 1962. 600 pp., 6 by 9. Available from University Microfilms as OP34068. Xerographic copy, paper binding, $69.60. Microfilm, $23.20.

A source book on commercial nuclear ship propulsion. Commercial shipping people, port authorities, regulation officials, construction and design engineers, and interested laymen and writers will find it a valuable source of information. Selected references to additional material are included. A substantial portion of the book is devoted to discussions of the N. S. Savannah, the first commercial nuclear ship.

Symposium on Nuclear Energy and Latin American Development

U. S. Atomic Energy Commission, 1968. 166 pp., 6 by 9. Available in English from NTIS as PRNC-112. Price schedule on page iii. Available in Spanish as Document CNPR-112 from Editorial U.P.R., Universidad de Puerto Rico.

Proceedings of a two-day conference held at the Puerto Rico Nuclear Center in October 1967 in commemoration of the 10th anniversary of the Center. Papers are by public leaders and scientists well known in the field of nuclear energy.

Thermionic Energy Conversion

(In two volumes)

G. N. Hatsopoulos, Thermo Electron Corp. and Massachusetts Institute of Technology, and E. P. Gyftopoulos, Massachusetts Institute of Technology

Volume I: Processes and Devices

MIT Press, 1973. 265 pp., 6 by 9, $17.95.
LC 72-13718 ISBN 0-262-08059-1

Volume II: Theory, Technology, and Application

In press. Estimated date of publication: winter 1977–1978.

A description of the experience and theoretical understanding of thermionic energy conversion. The two volumes are written both as texts for energy conversion studies and as references for scientists and engineers already in the field.

The first volume summarizes information which does not depend on any highly specialized theories and which will not be substantially altered by future developments. Thermionic converters are classified by type, and their performance characteristics are specified. The vacuum devices considered are diode, magnetic triode, and electrostatic triode

monograph is the first attempt to bring a number of such concepts together in a unified treatment. Simplified theories designed to stress concepts and interrelations are used extensively. Problems are included as an aid to the reader or for classroom use.

Energy in the Future

P. C. Putnam, consultant to the U. S. Atomic Energy Commission
D. Van Nostrand Co., 1953. 556 pp., 6 by 9. Available from University Microfilms as OP26072. Xerographic copy, paper binding, $64.60. Microfilm, $21.60.
LC 53-10097

An examination of the maximum plausible demands for energy during the next 50 to 100 years with a comparison of the ability of nuclear fuels and all nonnuclear sources of energy to meet these demands at low cost. Translated into Japanese.

Geothermal Energy as a Source of Electric Power: Thermodynamic and Economic Design Criteria

Stanley L. Milora, Oak Ridge National Laboratory, and
Jefferson W. Tester, Department of Chemical Engineering, Massachusetts Institute of Technology, on leave to the Los Alamos Scientific Laboratory
MIT Press, 1976. 194 pp., 6 by 9, $14.95.
LC 76-7008 (CIP) ISBN 0-262-13123-4

A monograph that considers the factors important in the development of geothermal energy as a viable source of electric power. New technologies are rapidly developing for improving the thermodynamic efficiency of power production toward its ideal limit as well as providing an economical process. Several hydrocarbons and their halogenated derivatives are being proposed as working fluids. They have considerably different properties from water in the low-temperature region, perhaps making them more suitable working fluids. The book will be useful to engineers interested in power production as well as to geologists, geochemists, and geophysicists involved with resource development.
CONTENTS: Summary and scope. Geothermal resources. Thermodynamic criteria. Power cycle thermodynamics. Criteria for turbines and pumps. Power cycle economics. Geothermal energy as a competitive producer of power—concluding remarks. Appendix. Nomenclature. References. Index.

The IEA Energy Simulation Model: A Framework for Long-Range U. S. Energy Analysis

Charles E. Whittle, David B. Reister, Ernest G. Silver, J. Frederick Weinhold, S. Basheer Ahmed, Harry E. Davitian, H. G. MacPherson, and Alfred M. Perry,
Institute for Energy Analysis, Oak Ridge Associated Universities
Oak Ridge Associated Universities, 1976. 161 pp., 9 by 11.
Available from NTIS as ORAU-125. Price schedule on p. iii.

A description of a model developed for simulating plausible U. S. energy supplies and demands for the last part of this century and the early part of the twenty-first century. It is intended to give policy makers a means of comparing various possible futures for energy supplies and demands and for determining which combinations allow a feasible match between the projected demands and the available domestic supplies.
CONTENTS: Abstract. Introduction. Modeling system. Projected U. S. energy demands. Primary energy sources and carrier supplies. Operation of the long-range model. Results and limitations of the model. Appendixes: demand analysis and tables; energy balance calculations by hand and by computer; details of eighteen scenarios; addenda; references noted in report and appendixes.

Nuclear Power and Radiation in Perspective: Selections from Nuclear Safety

Editor: J. R. Buchanan, Oak Ridge National Laboratory
Oak Ridge National Laboratory, 1974. 182 pp., 8 by 11. Available from NTIS as ORNL-NSIC-100. Price schedule on page iii.

Selections from the journal "Nuclear Safety" in which the risks of nuclear power and radiation are described to place them in perspective with other potential hazards faced by the public on a day-to-day basis. Topics covered include the effects of radiation, risk–benefit concepts, radiation risks relative to other risks, nuclear plant risks relative to

converters. The vapor devices discussed include such converter configurations as cesium diodes, low- and high-pressure diodes, cesium diodes with additives, supplemented vapor diodes, ion-emission triodes, and arc triodes.

The second volume develops the more advanced scientific aspects of the process, describes the experience with actual hardware now operational, and estimates the limits of parameters that are unlikely to be exceeded in the near future.

CONTENTS:

Volume I. Introduction. Ideal performance of diode thermionic converters. Vacuum thermionic converters. Vapor thermionic converters. References. Appendix. Index.

Volume II. Elements of quantum mechanics. Principles of thermodynamics. Thermodynamics of stable equilibrium states. Thermodynamics of steady states. Emission phenomena. Collisionless transport phenomena. Collisional transport phenomenon. Analysis of performance characteristics of high-pressure diodes. Experimental techniques. Experimental studies and correlations of characteristics. Metallurgy of electrode materials. Design and fabrication of practical converters. Thermionic power system engineering. Index.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

CCMS Solar Energy Pilot Study: Solar Heating and Cooling Systems in Buildings, Report of the Annual Meeting of
Palo Alto, Calif. Aug. 4–6, 1975. Sponsored by the Energy Research and Development Administration in conjunction with NATO Committee on the Challenges of Modern Society. 1975. 153 pp. Available from NTIS as UMD-4908-5.

Energy Awareness, Symposium for Public Awareness on Energy—1976
Knoxville, Tenn. Feb. 27, 1976. Sponsored by 16 technical and engineering societies in East Tennessee in cooperation with the Americans for Energy Independence, Department of Commerce, Federal Energy Administration, Nuclear Division of Union Carbide Corporation, and Energy Research and Development Administration. 1976. 260 pp. Available from NTIS as CONF-760205.

Energy and the Environment, Proceedings of the Third National Conference on
Hueston Woods State Park, Ohio. Sept. 29–Oct. 1, 1975. Sponsored by the Dayton and Ohio Valley Sections of the American Institute of Chemical Engineers. 1975. 415 pp. Available from the Dayton Chapter of the American Institute of Chemical Engineers, $22.50.

Energy Sources for the Future, Symposium on
Oak Ridge, Tenn. July 7–25, 1975. Conducted by Oak Ridge Associated Universities and sponsored by Energy Research and Development Administration. 1975. 312 pp. Available from NTIS as CONF-750733.

Energy Storage—User Needs and Technology Applications
Executive Summary containing highlights of the papers and panel discussions.
Asilomar, Calif. Feb. 8–13, 1976. Sponsored by Electric Power Research Institute and Energy Research and Development Administration. 1976. 60 pp. Available from NTIS as CONF-760212.

First Geopressured Geothermal Energy Conference
Austin, Tex. June 2, 1975. Sponsored by the University of Texas at Austin and Energy Research and Development Administration. 1975. 363 pp. Available from NTIS as CONF-750612.

Mid-Appalachia Energy Symposium, Complete Proceedings of
Knoxville, Tenn. Oct. 6, 1975. Sponsored by the White House Office of Public Liaison and the University of Tennessee in conjunction with Appalachian Regional Commission, Energy Research and Development Administration, and Federal Energy Administration. 1975. 165 pp. Available from NTIS as CONF-751080.

National Energy Youth Conference on Today's Challenge for Tomorrow's Leaders
Oak Ridge, Tenn. July 30, 1974. Sponsored by Federation of Americans Supporting Science and Technology with the assistance of Oak Ridge Associated Universities. March 1975. 281 pp. Available from NTIS as CONF-740751.

Systems Engineering for Power, Proceedings on
Henniker, N. H. Aug. 17, 1975. Sponsored by Energy Research and Development Administration. 1975. 487 pp. Available from NTIS as CONF-750867.

Technology and the Use of Lignite
Grand Forks, N. Dak. May 14–15, 1975. Sponsored by the University of North Dakota and

the Energy Research and Development Administration. 1976. 375 pp. Available from NTIS as GFERC/IC-75/2.

Utilization of Volcano Energy, U.S.–Japan Cooperative Science Seminar on
Hilo, Hawaii, Feb. 4–8, 1974. Sponsored by U. S. National Science Foundation and Japan Society for the Promotion of Science. 1974. 680 pp. Available from NTIS as CONF-740209.

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Air Products and Chemicals, Inc., Allentown, Pa. January 1976. 69 pp. Available from NTIS as ERDA-76-68.

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Gasification, Liquefaction, Desulfurization, A Bibliography, 1930–1974
USAEC Technical Information Center. October 1974. 763 pp. Available from NTIS as TID-3349.

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ERDA Technical Information Center.
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Electric Batteries, A Bibliography
ERDA Technical Information Center. In press. Estimated date of publication: summer 1977. Will be available from NTIS as TID-3361.

Fuel Cells, A Bibliography
ERDA Technical Information Center. In press. Estimated date of publication: summer 1977. Will be available from NTIS as TID-3359.

Geothermal Resources: Exploration and Exploitation
ERDA Technical Information Center. March 1975. 400 pp. Available from NTIS as TID-3354.

Hydrogen Fuels, A Bibliography
ERDA Technical Information Center. February 1976. 479 pp. Available from NTIS as TID-3358.

Inventory of Energy Research and Development: 1973–1975
Oak Ridge National Laboratory. January 1976. Five volumes. Available from GPO as Y4.SCI2:94.2/U.

Methanol from Coal Fuel and Other Applications
Institute for Energy Analysis, Oak Ridge, Tenn. February 1976. 61 pp. Available from NTIS as ORAU-126.

New Energy Technology Coefficients and Dynamic Energy Models
Mitre Corporation, McLean, Va.
Volume 1: Summary, Main Report, and Appendices A–C
January 1975. 161 pp. Available from NTIS as ERDA-3(Vol. 1 of 2).
Volume 2: Appendices D–O
January 1975. 386 pp. Available from NTIS as ERDA-3(Vol. 2 of 2).

Oil Shale and Shale Oil, Bibliography of
Bureau of Mines, Laramie Energy Research Center. December 1974. 44 pp. Available from NTIS as TID-26776.

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ERDA Morgantown Energy Research Center. 1975. 104 pp. Free. Available from Morgantown Energy Research Center as MERC/SP-75/2.

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Sandia Laboratories. March 1976. 66 pp. Available from NTIS as SAND-75-0605.

Solar Energy, A Bibliography
ERDA Technical Information Center.
Citations. March 1976. 585 pp. Available from NTIS as TID-3351-R1P1.
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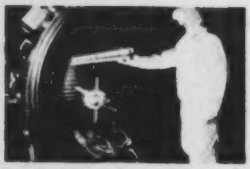
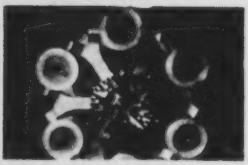
University of New Mexico Technology Application Center. 1975. 503 pp. Available from NTIS as TAC-W-75-700.





ENGINEERING AND INSTRUMENTATION

Antennas and Waves: A Modern Approach

Ronold W. P. King, Harvard University, and Charles W. Harrison, Jr., Sandia Corporation
MIT Press, 1969. 778 pp., 7 by 10, $22.00.
LC 74-97494 ISBN 0-262-08036-2

A comprehensive presentation that updates the authors' two previous texts. This book comprises a completely different text that considerably simplifies the old approach and covers the entire field that has been published over the past fifteen years. The material on ionized and dispersive media is of particular interest because of developments in the satellite and military programs, and the chapters on pulse or transient response will interest persons involved in the area of wideband systems.

Boundary Lubrication: An Appraisal of World Literature

Compilers and editors: F. F. Ling, E. E. Klaus, and R. S. Fein
American Society of Mechanical Engineers, 1969. 576 pp., 9 by 12. $33.50 for nonmembers; $16.75 for members.
LC 70-79165

An updated, comprehensive, and critical appraisal of world literature aimed at providing designers with an increased understanding of boundary lubrication problems. This volume defines terms, one of the biggest problems in this field, presents current knowledge, and sorts a confounding wealth of facts. The book contains 2711 edited abstracts of articles and books published between 1946 and 1966.

Concepts of the True Position Dimensioning System

(Revised edition)
R. F. Utter, A. D. Bridegam, R. O. Dell, R. E. Dunlap, D. R. Fisher, and J. E. Taylor, Sandia Corporation
Central Scientific Company, 1969. 173 pp., 8 by 11. Available from University Microfilms as PB2186. Xerographic copy, paper binding, $36.80. Microfilm, $12.30.

A description of the concepts of true position dimensioning and the necessary conventions and notations to express these concepts of drawings. The book discusses the three-plane concept, the tolerances of position and form, and modifiers applied to datum features.

Cryogenic Engineering

Russell B. Scott, Cryogenic Engineering Laboratory, National Bureau of Standards

D. Van Nostrand Co., 1959. 375 pp., 6 by 9, $11.50.
LC 59-9765 ISBN 0-442-07471-9

A book intended primarily for students, engineers, and scientists who are unfamiliar with low-temperature techniques. It outlines the practical aspects of cryogenic processes and equipment, at the same time providing a careful discussion of the underlying theory. The entire range of cryogenic engineering is covered: the development and improvement of low-temperature processes and equipment; the determination of the physical properties of materials used to produce, maintain, and utilize low temperatures; and the practical application of low-temperature techniques and processes. The author has selected the most important and useful developments, concentrating on those features which seem likely to have further applications. Translated into Polish.

Design, Construction, and Testing of High-Efficiency Air Filtration Systems for Nuclear Application

C. A. Burchsted and A. B. Fuller, Oak Ridge National Laboratory

Oak Ridge National Laboratory, 1970. 196 pp., 9 by 11. Available from NTIS as ORNL-NSIC-65. Price schedule on page iii.

A handbook designed to bring to the attention of the designers and architect-engineers the kind of problems faced by an operator of high-efficiency air cleaning systems and what the designer must do to preclude or alleviate the problems. To review current practices in the field and to define the problems in operating, maintaining, and controlling contamination release from air-cleaning systems, the authors visited AEC production reactors, commercial power reactors, laboratories, radiochemical plants, reactor fuel manufacturers, clean rooms, equipment manufacturers, and a chemical-biological warfare installation. The presentation gives the authors' recommendations and points out poor practices in current design.

Design Principles of Reactor Protection Instrument Systems

S. H. Hanauer, University of Tennessee, and C. S. Walker, Oak Ridge National Laboratory

Oak Ridge National Laboratory, 1968. 95 pp., 8 by 11. Available from NTIS as ORNL-NSIC-51. Price schedule on page iii.

A review that establishes and justifies a consistent set of principles for the design of reactor protection systems, with the emphasis on the designs of systems rather than on the designs of instruments. The authors define the protection system as those assemblies of instruments, and only those, whose failure to function when needed would be intolerable. Other instruments and control devices constitute the operation system. The presentation discusses the reliability and performance of protection systems and the factors that contribute to each. Also, the interrelation between protection and operation systems is examined.

Design of Resonant Piezoelectric Devices

Richard Holland and E. P. EerNisse, Sandia Corporation

MIT Press, 1969. 288 pp., 6 by 9, $15.95.
LC 76-78096 ISBN 0-262-08033-8.

An attempt to better acquaint engineers with the great improvements in mathematical techniques for dealing with piezoelectric devices. The authors focus on basic principles and theoretical techniques and their applications to real design problems.

Design Techniques for Improving Human Performance in Production

Alan D. Swain

Industrial and Commercial Techniques Ltd., 1974. 140 pp., 9 by 11, £5.00 ($9.00 approx.).

A description of a work-situation approach, based on ergonomics, to improve human performance in industry. The data are obtained (1) from an analytical study of planned or actual industrial operations and (2) from production workers participating in an error cause removal program. The data are evaluated to see what design changes can be made in the work situation to reduce the probability of errors and resulting defects, accidents, or unwanted results. In essence, the total effort amounts to a "design for producibility." The detailed analysis of production tasks can also be used to develop job-relevant criteria for selection and training programs.

CONTENTS: Part 1: Introduction. Part 2: Man in the Industrial Setting. The nature of human error. Factors that shape the quality of human performance. Man versus machines. Part 3: Approaches to Improve Quality of Industrial Production. Selection, placement, and

training. The motivational approach to improving performance. The work situation approach to improving performance in industry. Part 4: Design Techniques for Reducing Human Errors in Production. Error identification and analysis methods. Prediction of errors and their consequences. An error-cause removal program. Part 5: Summary and Conclusions. References. Appendix: some ergonomics principles for design of industrial tasks.

Electrical Circuits for Calutrons

(National Nuclear Energy Series, Division I, Volume 3)

Editors: R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory

U. S. Atomic Energy Commission, 1949. 280 pp., 6 by 9. Available from University Microfilms as OP6231: Xerographic copy, paper binding, $33.30. Microfilm (35 mm), $11.10. Also available from Microforms International: Microfilm (16 mm), $10.00.

A description of the various regulator systems that were developed for use as auxiliaries to the basic power-supply units to permit the attainment of a sufficiently high degree of voltage and current stabilization to meet the normal calutron operating requirements.

Electrical Equipment for Tanks and Magnets

(National Nuclear Energy Series, Division I, Volume 10)

C. R. Baldock and E. D. Hudson, Carbide and Carbon Chemicals Corporation

U. S. Atomic Energy Commission, 1947. 401 pp., 6 by 9. Available from University Microfilms as OP6227: Xerographic copy, paper binding, $47.40. Microfilm (35 mm), $15.80. Also available from Microforms International: Microfilm (16 mm), $14.50.

An account of the electrical engineering phases of the electromagnetic process for the separation of uranium isotopes as they relate particularly to the electrical equipment for the tanks and magnets used in operating the calutron at the Clinton Engineer Works.

Electronics: Experimental Techniques

(National Nuclear Energy Series, Division V, Volume 1)

William C. Elmore, Swarthmore College, and Matthew Sands, Massachusetts Institute of Technology

McGraw-Hill, 1949. 417 pp., 6 by 9. Available from University Microfilms as OP13915 ED1: Xerographic copy, paper binding, $49.60. Microfilm (35 mm), $16.60. Also available from Microforms International: Microfilm (16 mm), $15.00.

A description of circuits designed for electronic instrumentation by the Electronics Group at Los Alamos Scientific Laboratory during 1943 to 1945.

Engineering Developments in the Gaseous Diffusion Process

(National Nuclear Energy Series, Division II, Volume 16)

Editors: Manson Benedict, Hydrocarbon Research, Inc., and Clarke Williams, Brookhaven National Laboratory

McGraw-Hill, 1949. 129 pp., 6 by 9. Available from University Microfilms as OP13868: Xerographic copy, paper binding, $17.00. Microfilm (35 mm), $6.00. Also available from Microforms International: Microfilm (16 mm), $10.00.

A description of research and engineering developments relative to auxiliary devices necessary in the development of the gaseous diffusion process.

Engineering for Nuclear Fuel Reprocessing

Justin T. Long, Chemical Technology Division, Oak Ridge National Laboratory

Gordon and Breach, 1967. 1023 pp., 7 by 9. Available from American Nuclear Society, $50.00.
LC 66-28071

A readable, comprehensive summary of the contributions to chemical engineering technology arising from the processing of spent nuclear reactor fuel. Nuclear-fuel reprocessing is the first large-scale maturation of an endeavor to carry out entirely by remote operation a complete scheme of operations in a lethal environment. The technology evolved provides a valuable basis for remote operation in other, newer technologies—in space, on the ocean floor, and in germ-free biological research—and makes possible safer operation in such established industries as the manufacture of explosives and insecticides.

Experimental Stress Analysis and Motion Measurement

Richard C. Dove and Paul H. Adams
Charles E. Merrill Publishing Co., 1964. 608 pp., 6 by 9, $19.95.
LC 64-12874

A text for the student or engineer in experimental stress analysis or in shock and vibrations test work. This book provides a broad treatment that includes material for experimentalists working in the field of mechanics. The reader needs a normal background of applied mechanics and basic electrical circuits but not of elasticity or vibrations. Electrical resistance gages are discussed in detail; such experimental methods as the moiré fringe and semiconductor gages are given more than cursory attention; and the photoelastic method of stress analysis is extended into dynamic stress analysis, thermostress analysis, and surface-coating techniques. The basic theory of seismic instruments is presented and extended to cover the transient motion case, and piezoelectric accelerometers and associated circuitry are discussed in detail. The suggested experiments have been designed so that a wide variety of equipment can be used in conducting them.

Functional Gaging

(Second edition, revised)
Edward S. Roth, Sandia Corporation
Society of Manufacturing Engineers, 1970. 144 pp., 6 by 9, $7.50.
LC 74-118771 ISBN 0-87263-019-6

A clear, concise presentation of true-position dimensioning for fixed-element receiver gaging. The text limits itself to functional gages, i.e., gages which receive the part being inspected and which contain fixed elements (pins, bushing, etc.) to check part features. Part of the SME Manufacturing Data Series, this volume is of value to manufacturing engineers, product designers, industrial engineers, gage designers, and quality-control engineers.

High-Voltage Problems

(National Nuclear Energy Series, Division I, Volume 9)
J. D. Trimmer, Physics Department, University of Tennessee,
and Harry Pearlman, North American Aviation, Inc.
Editor: H. Wesley Savage, Carbide and Carbon Chemicals Company
U. S. Atomic Energy Commission, 1951. 226 pp., 6 by 9. Available from University Microfilms as OP6230: Xerographic copy, paper binding, $25.80. Microfilm (35 mm), $8.60. Also available from Microforms International: Microfilm (16 mm), $10.00.

An account of the work done in connection with the high voltage systems used in the electromagnetic separation process.

Ionization Chambers and Counters: Experimental Techniques

(National Nuclear Energy Series, Division V, Volume 2)
Bruno B. Rossi, Massachusetts Institute of Technology, and Hans H. Staub,
Stanford University
McGraw-Hill, 1949. 243 pp., 6 by 9. Available from University Microfilms as OP16858: Xerographic copy, paper binding, $29.80. Microfilm (35 mm), $10.00. Also available from Microforms International: Microfilm (16 mm), $10.00.

A discussion of the fundamental features of ionization and the general properties of detectors based on the ionization process. A description is given of the construction of some typical detectors and their operation.

Lubrication in Turbulent Regime

V. N. Constantinescu, Institute of Applied Mechanics, Bucharest, Rumania
Editor of translation: Ralph A. Burton, Southwest Research Institute
U. S. Atomic Energy Commission, 1968. 321 pp., 6 by 9. Available from NTIS as AEC-tr-6959. Price schedule on page iii.

The first definitive work in the field of turbulent film lubrication. This book outlines the fundamental concepts of importance in the nuclear power field where liquid metals of low kinematic viscosity are to be used as lubricants in high-performance turbomachines. It was translated from Rumanian by the Israel Program for Scientific Translations, Ltd., under the Special Foreign Currency Science Information Program administered by the U. S. National Science Foundation.

Nuclear Air Cleaning Handbook

C. A. Burchsted, Nuclear Division, Union Carbide Corporation, A. B. Fuller, Fuller Engineering Company, and J. E. Kahn, Nuclear Division, Union Carbide Corporation
Energy Research and Development Administration, 1976. 302 pp., 9 by 11.

Available from NTIS as ERDA 76-21. Paper copy, $9.75. Microfiche, $3.00.

LC 76-52974 ISBN 0-87079-103-6

A handbook that is a revision of "Design, Construction, and Testing of High-Efficiency Air Filtration Systems for Nuclear Application." The new edition updates the information of the original volume, corrects some errors, and adds some new material, particularly in the areas of sand filters, deep-bed glass fiber filters, and requirements for plutonium and reprocessing plants. It draws on the wealth of background data available, evaluates it, and provides guidance to the engineer and technologist in the design of future nuclear facilities and the control of gaseous effluents.

CONTENTS: Introduction. System considerations. Internal components. Housing design and layout. External components. Small air cleaning units. Glove box filtration. Testing. Special-application requirements. Appendixes: sample air cleaning equipment specifications; estimating forms; care and handling of HEPA filters; seismic design and qualification of ESF air cleaning systems. Index.

Nuclear Power Reactor Instrumentation Systems Handbook

(In two volumes)

Editors: Joseph M. Harrer, Argonne National Laboratory, and James G. Beckerley, U. S. Atomic Energy Commission
U. S. Atomic Energy Commission. Both volumes 9 by 11.

LC 72-600355

Volume I

1973. 313 pp. Available from NTIS as TID-25952-P1. Paper copy, $7.60. Microfiche, $3.00.

Volume II

1974. 282 pp. Available from NTIS as TID-25952-P2. Paper copy, $7.60. Microfiche, $3.00.

A handbook on the performance and characteristics of the major components of power-reactor instrumentation systems, with emphasis on the systems aspect and minimum discussion of component design. All systems aspects are discussed, including the problems associated with the interface problems of integrating individual components into subsystems and systems. The book is intended for the designers and operators of power-reactor instrumentation systems, i.e., for those concerned with the applications, not the invention, of devices.

CONTENTS:

Volume I. Fundamental considerations. Nuclear radiation sensors—out-of-core. Neutron sensors—in-core. Process instrumentation. Neutron-flux signal conditioning. Transfer-function measurement systems. Control-rod drives and indicating systems. Process computer applications and data handling. Power supplies. Installation of instrumentation. Quality assurance and reliability. Index.

Volume II. Protection systems. Plant and personnel radiation monitoring. Standards, codes, and criteria. PWR instrumentation systems. Boiling-water reactor instrumentation systems. Sodium-cooled reactor instrumentation systems. Gas-cooled reactor instrumentation systems. Appendix. Index.

Optical Instrumentation

(National Nuclear Energy Series, Division IV, Volume 8)

Editors: George S. Monk, University of Chicago, and W. H. McCorkle, Argonne National Laboratory
McGraw-Hill, 1954. 262 pp., 6 by 9. Available from University Microfilms as
OP13916: Xerographic copy, paper binding, $32.90. Microfilm (35 mm), $11.00.
Also available from Microforms International: Microfilm (16 mm), $10.00.

A detailed discussion of the principles of design and institute research into the development of optical glasses to withstand the destructive effects of high-energy radiations, as well as of the use of plastic lenses in instruments of high quality and resolution.

Protection Instrumentation Systems in Light-Water-Cooled Power Reactor Plants

H. G. O'Brien and C. S. Walker, Oak Ridge National Laboratory

Oak Ridge National Laboratory, 1969. 147 pp., 9 by 11. Available from NTIS as ORNL-NSIC-29. Price schedule on page iii.

A state-of-the-technology review that describes and comments on the designs of four typical protection instrumentation systems for boiling- and pressurized-water power reactors. The discussion is centered on the designing of system arrangements for the instrumentation and actuators that will initiate protective action. The authors examine the system and logic arrangements used in current designs and the potential reliability of the information-handling systems for initiating protective action. The instruments are considered as complementary to the system or logic arrangement, and the instruments themselves are discussed primarily in relation to the effects of their failures on the operation of the overall protection systems.

Radioisotope Measurement Applications in Engineering

Robin P. Gardner and Ralph L. Ely, Jr., Research Triangle Institute and North Carolina State University

Reinhold Publishing Corp., 1967. 483 pp., 6 by 9. Available from Krieger, $19.95.
LC 67-21650

An illuminating text–reference in radioisotope methods intended for use at the senior or graduate level in all engineering disciplines. This text is of value to all industries heavily involved with instrumentation and control, especially chemical, plastics, food, paper, textile, and petroleum industries. Problems with answers and extensive references add to the usefulness of each chapter, and 15 detailed laboratory experiments enhance the versatility of the text.

Remote Handling of Mobile Nuclear Systems

D. C. Layman and G. Thornton, Nuclear Materials and Propulsion Operation, Flight Propulsion Division, General Electric Company

U. S. Atomic Energy Commission, 1966. 655 pp., 6 by 9. Available from NTIS as TID-21719. Price schedule on page iii.
LC 66-60017

A book on remote handling which surveys and reports the significantly useful information and experience developed by the General Electric Aircraft Nuclear Propulsion Department to service and maintain their direct-air-cycle nuclear systems remotely. This book is for engineers actively engaged in the design or operation of remote handling facilities. Techniques, methods, hardware, and a unique philosophy are described. These are expected to be useful to engineers in other fields in the operation of remote-handling facilities, especially those handling heavy equipment in hot cells.

Sources and Collectors for Use in Calutrons

(National Nuclear Energy Series, Division 1, Volume 6)

Editors: R. K. Wakerling, Radiation Laboratory, University of California and A. Guthrie, U. S. Naval Radiological Defense Laboratory

U. S. Atomic Energy Commission, 1949. 273 pp., 6 by 9. Available from University Microfilms as OP6228: Xerographic copy, paper binding, $32.10. Microfilm (35 mm), $10.70. Also available from Microforms International: Microfilm (16 mm), $10.00.

An account of the theory and design of the various ion sources and collectors used in calutrons at the Radiation Laboratory, University of California.

Thermal Stress Techniques in the Nuclear Industry

Editors: Zenons Zudans, Tsi Chu Yen, and William H. Steigelmann, The Franklin Institute Research Laboratories

American Elsevier Publishing Co., 1965. 583 pp., 6 by 9, $20.00.
LC 65-22806 ISBN 0-444-00002-X

A basic discussion to impart the background information on thermal stress, the applicable equations to serve as tools for the solutions of problems, and examples to underscore the methods of application. The authors have extracted facts and theories from several arts which are necessary for handling thermal-stress problems. The approach is practical and applies to hardware used in nuclear reactors.

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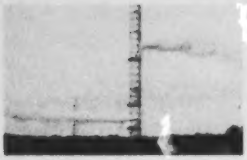
Cooling Systems: Towers, Ponds, and Once-Through Cooling
Oak Ridge National Laboratory. May 1974. 127 pp. Available from NTIS as ORNL-EIS-74-66.

Flow Induced Vibrations, Annotated Bibliography on
Argonne National Laboratory. January 1974. 127 pp. Available from NTIS as ANL-CT-74-5.

International Directory of Solid State Materials Production and Research
Oak Ridge National Laboratory. June 1975. 171 pp. Available from NTIS as ORNL-RMIC-13.

Invariant Imbedding and Related Topics, Bibliography on
Sandia Laboratories. June 1974. 120 pp. Available from NTIS as SLA-74-284.

Radiometric Gages
USAEC Technical Information Center. January 1974. 125 pp. Available from NTIS as TID-3338.



ENVIRONMENT

Aerodynamic Characteristics of Atmospheric Boundary Layers

(AEC Critical Review Series)

Erich J. Plate, Argonne National Laboratory and Karlsruhe University

U. S. Atomic Energy Commission, 1971. 190 pp., 7 by 10. Available from NTIS as TID-25465. Paper copy, $3.00. Microfiche, $3.00.
LC 70-611329

A summary of what is known about mean flow conditions in the atmospheric boundary layer. The subject has been developed in four chapters covering four aspects of boundary layers: the Ekman layer in neutrally stratified turbulent flow; the effect of thermal stratification on mean velocity distributions and heat transfer near the ground; the structure of free-convection layers; and the theory of disturbed boundary layers, such as exists at a change in roughness or near shelter belts. For each of these areas, recent research is surveyed and integrated into a coherent account of mean properties of the wind and temperature fields in these conditions. A series of suggestions is given for future research to extend the limits of our knowledge, with particular emphasis on laboratory experiments.

Atmosphere—Surface Exchange of Particulate and Gaseous Pollutants (1974)

(ERDA Symposium Series)

Coordinators: Rudolf J. Engelmann, U. S. Atomic Energy Commission, and George A. Sehmel, Battelle, Pacific Northwest Laboratories

Energy Research and Development Administration, 1976. 1000 pp., 6 by 9. Available from NTIS as CONF-740921. Paper copy, $13.60. Microfiche, $3.00.
LC 75-38716 (CIP)

Proceedings of a symposium held at Richland, Wash., Sept. 4–6,1974, sponsored by Battelle, Pacific Northwest Laboratories, and the Division of Biomedical and Environmental Research, U. S. Atomic Energy Commission. This symposium concerned atmospheric removal by dry deposition and insertion rates by resuspension, and the proceedings provide a state-of-the-art statement in these areas. Participants, including representatives of six foreign countries, reported research from universities, state and federal government organizations, and government contractors. Much of the research was directed toward predicting the behavior of inadvertent emissions from nuclear facilities, but, since particle

motion basically is not controlled by particle toxicity, the nuclear research applies also to nonnuclear emissions, such as fossil-fuel particulates and gaseous sulfur emissions.
CONTENTS: Deposition (27 papers and a general discussion). Resuspension (31 papers and summary and concluding remarks). Index.

Atmospheric Transport Processes

(ERDA Critical Review Series; in four volumes)
Elmar R. Reiter, Department of Atmospheric Science, Colorado State University
Energy Research and Development Administration. All volumes 7 by 10.
LC 76-603262

Part 1: Energy Transfers and Transformations
1969. 253 pp. Available from NTIS as TID-24868. Paper copy, $6.00. Microfiche, $3.00.
A detailed discussion of the dynamics of atmospheric flow patterns and the general circulation of the atmosphere. The processes involved will be of vital interest to those concerned with air-pollution control and planning. Not only industrial pollution but also contamination from nuclear experiments, aviation, and space technology are included.
CONTENTS: Angular momentum balance. Energy fluxes and transformation in the general circulation of the atmosphere. Spectral considerations of eddy transports. Geographic and curvilinear coordinate systems. Conclusions and outlook. Author and subject indexes.

Part 2: Chemical Tracers
1971. 382 pp. Available from NTIS as TID-25314. Paper copy, $6.00. Microfiche, $3.00.
A review of the work of various investigators dealing with the distribution of chemical tracers in the atmosphere. The use of trace constituents of the atmosphere in estimating the effects of the general circulation has opened into a wide field of research. This book focuses on the large-scale aspects of the atmospheric circulation and on the effect of this circulation on tracer distributions. Future research in this fertile field should produce more cooperation between the chemists, atmospheric dynamicists, and synopticians and thus provide better returns from the intricate and complex experiments necessary in exploring the many aspects of our global atmosphere and of the atmospheres of other planets.
CONTENTS: Introduction and theoretical considerations. Water vapor as a tracer. Carbon dioxide. Ozone. Oxygen as a tracer. Other chemical tracers. Conclusions and outlook. References. Author and subject indexes.

Part 3: Hydrodynamic Tracers
1972. 212 pp. Available from NTIS as TID-25731. Paper copy, $3.00. Microfiche, $3.00.
A review dealing with the hydrodynamic and thermodynamic quantities that are quasi-conservative in atmospheric large-scale flow patterns and hence may be used as air-mass tracers. Foremost among such tracers are adiabatic air motions on isentropic trajectories. Detailed descriptions of trajectory construction techniques are given. Conservation of potential vorticity also serves as a powerful tool in tracing air masses of stratospheric or tropospheric origin. Isentropic trajectory and potential vorticity analyses serve to illustrate the large-scale exchange processes between troposphere and stratosphere. Transport processes in the planetary boundary layer which are complicated by diurnal diabatic heating and cooling are described.
CONTENTS: Introduction. Conservation of mass and energy. Air motions in an isentropic coordinate system. Absolute angular momentum. Absolute vorticity. Potential vorticity. Transport in the planetary boundary layer. Conclusions. List of symbols. References. Author and subject indexes.

Part 4: Radioactive Tracers
In press. Estimated date of publication: winter 1977–1978.
A volume dealing with the tracer properties of radioactive contaminants in the atmosphere.

Biological Implications of Metals in the Environment

(ERDA Symposium Series)
Chairmen: Harvey Drucker and Raymond E. Wildung, Battelle, Pacific Northwest Laboratories
Energy Research and Development Administration, in press.
Estimated date of publication: spring 1977. 680 pp. (est.), 6 by 9. Will be available from NTIS as CONF-750929. Paper copy, $10.50. Microfiche, $3.00.
Proceedings of the Fifteenth Annual Hanford Life Sciences Symposium, Richland, Wash., Sept. 29–Oct. 1, 1975, sponsored by Battelle, Pacific Northwest Laboratories and Energy Research and Development Administration.
CONTENTS: Five main subject areas: Biochemistry of metal transformations (8 papers).

Form and distribution of metals in soils, sediments, and associated waters (13 papers). Form and distribution of metals in plants (10 papers). Form and distribution of metals in animals (16 papers). Implications for man and the environment (2 papers). Index.

Biological Implications of the Nuclear Age

(AEC Symposium Series)

Cochairmen: Bernard Shore and Frederick Hatch, Lawrence Radiation Laboratory

U. S. Atomic Energy Commission, 1969. 334 pp., 6 by 9. Available from NTIS as CONF-690303. Paper copy, $6.00. Microfiche, $3.00.
LC 74-603800

Proceedings of a symposium held at Livermore, Calif., Mar. 5–7, 1969, sponsored by the Lawrence Radiation Laboratory and the U. S. Atomic Energy Commission. Experts doing research in a broad range of topics discussed the impact of present and future release of radiation and radionuclides upon the biosphere, especially upon man, from nuclear activities.

Calculation of Doses Due to Accidentally Released Plutonium from an LMFBR

B. R. Fish, G. W. Keilholtz, and W. S. Snyder, Oak Ridge National Laboratory, and S. D. Swisher, National Oceanic and Atmospheric Administration

Oak Ridge National Laboratory, 1972. 123 pp., 9 by 11. Available from NTIS as ORNL-NSIC-74. Price schedule on page iii.

An examination of the experimental data and analytical models to be considered in assessing the transport properties of plutonium aerosols after a hypothetical reactor accident. Behaviors of released airborne materials have been semiquantitatively predicted both for the environment within the reactor containment systems and for the atmosphere near the reactor-site boundaries. Models are prepared on the intake and metabolism of plutonium oxide, and possible doses from plutonium aerosols are calculated. To the extent possible, dose-response data and models are reviewed and their adequacy assessed so that recommended or preferred practices could be developed.

CONTENTS: Introduction. Behavior of released sodium oxide and plutonium-bearing particles. Transport, settling, and redistribution of aerosols in the outside air (troposphere). Chemistry of plutonium. Intake and metabolism of plutonium dioxide. Computation of internal dose. Summary.

Carbon and the Biosphere

(AEC Symposium Series)

Coordinators: George M. Woodwell and Erene Pecan, Brookhaven National Laboratory

U. S. Atomic Energy Commission, 1973. 399 pp., 6 by 9. Available from NTIS as CONF-720510. Paper copy, $10.60. Microfiche, $3.00.
LC 73-600092

Proceedings of a symposium held at Upton, L. I., N. Y., May 16–18, 1972, sponsored by the Brookhaven National Laboratory and the U. S. Atomic Energy Commission. There is basic agreement that the earth's carbon budget is being drastically changed in a very short time and that these changes appear to be a function of man's activities. The change is probably the most abrupt the biosphere has experienced in all the earth's history. It is remarkable that, although these changes are clear, they are poorly understood and their implications hardly more than guesses. Recurring questions focus around such fundamentals as the size of various segments of the biota and the type and magnitude of transformations it performs. This symposium is devoted to a further exploration of these recurring questions and is successful in its attempt to resolve the limits of knowledge of the world's carbon cycle and in clarifying major objectives in the science of environment.

CONTENTS: Five main subject areas: The cycle of carbon (4 papers). The atmosphere (5 papers). Oceans, estuaries, and fresh water (4 papers). Symposium lecture. Carbon on land (4 papers). Summary and envoi. Appendix: summary of world carbon cycle and recommendations for critical research. Index.

Chemical Fallout: Current Research on Persistent Pesticides

Editors: Morton W. Miller and George C. Berg, University of Rochester

Charles C Thomas, Publisher, 1969 (second printing, 1972). 553 pp., 6 by 9, $22.50.

LC 69-19178 ISBN 0-398-01313-6

Proceedings of the First Rochester Conference on Toxicity (June 1968). The conference was organized to discuss the problems of the organomercurials and the organochlorines and to bring together ecologists, toxicologists, and public health physicians.

The Columbia River Estuary and Adjacent Ocean Waters: Bioenvironmental Studies

Editors: A. T. Pruter and Dayton L. Alverson, National Marine Fisheries Service, National Oceanic and Atmospheric Administration

University of Washington Press, 1972. 896 pp., 7 by 10, $22.00.
LC 79-178705 ISBN 0-295-95177-X

Thirty-three environmental studies which describe the physical, chemical, and biological aspects of the Columbia River estuary and adjacent ocean waters and which measure radionuclides in the physical environment and the biota. These studies, carried out by the University of Washington, Oregon State University, Battelle Memorial Institute, and the National Oceanic and Atmospheric Administration, augment the general body of published information on effects of low-level radioactive wastes introduced into the environment by the nuclear reactors at Hanford, Wash. In addition to their general bearing on understanding and predicting the fate of radionuclides in the environment, these articles contribute much information on the nature of the fauna, sediments, and ocean processes in the area.

CONTENTS: Four main subject areas: Background papers (4 chapters). Ocean relationships (9 chapters). Composition and distribution of marine-environment biota (11 chapters). Radionuclides in the ecosystem (9 chapters). Summary. Index.

Cooling Tower Environment—1974

(ERDA Symposium Series)

Coordinators: Steven R. Hanna, Atmospheric Turbulence and Diffusion Laboratory, National Oceanic and Atmospheric Administration, and Jerry Pell, Department of Natural Resources, State of Maryland

Energy Research and Development Administration, 1975. 648 pp., 6 by 9.
Available from NTIS as CONF-740302. Paper copy, $13.60. Microfiche, $3.00.
LC 75-600010 (CIP)

Proceedings of a symposium held at the University of Maryland Adult Education Center, College Park, Md., Mar. 4–6, 1974, sponsored by the State of Maryland Power Plant Siting Program and the U. S. Atomic Energy Commission. Participants, including representatives of four foreign countries, report on work from industry, universities, state and federal government agencies, and government contractors. Numerous models of plume rise, diffusion, and drift deposition are proposed, and methodologies for selecting optimum cooling systems and measuring plume characteristics are described. The potential for interactions (effects) of drift with the biotic components is identified, and several studies report on biological effects from drift deposition.

CONTENTS: Papers dealing with the technology of cooling towers, plume rise, visible plumes, ecological effects, drift deposition measurement and models, and the views, problems, and needs of the electricity-generating industry (32 papers). Index.

Decontamination of Nuclear Reactors and Equipment

Editor: J. A. Ayres, Pacific Northwest Laboratory

Ronald Press, 1970. 825 pp., 6 by 9, $25.50.
LC 76-110543

A summarization of the available research and development information on the radioactive decontamination of nuclear reactors and associated equipment, "decontamination" being the removal of radioactivity from surfaces that have become "contaminated" with adhering radioactivity. Contributors are from a number of active sites in the United States, England, Canada, and France. Audience for this book will be technical or management personnel who either design or operate reactors or who might be in the primary business of radioactive decontamination. Much of the content will, however, provide useful information to anyone who, in handling radioactive materials, spills them and is faced with the subsequent problem of decontamination.

Ecological Aspects of the Nuclear Age: Selected Readings in Radiation Ecology

Compilers: Vincent Schultz, Washington State University, and F. Ward Whicker, Colorado State University

U. S. Atomic Energy Commission, 1972. 588 pp., 9 by 11. Available from NTIS as TID-25978. Paper copy, $6.00. Microfiche, $3.00.

LC 72-600120

A selection of scientific literature on the fate and effect of radionuclides in the environment compiled in the belief that an informed aroused public is much more desirable than one that is sometimes uninformed and belligerent. These selected readings, covering terrestrial, freshwater, and marine environments, bring together some relatively recent summaries in the field of radiation ecology; studies of populations, communities, and ecosystems; and papers of historical interest. All these materials have appeared elsewhere, and all sources are carefully cited. The emphasis is on literature in English, including translations into English. CONTENTS: Five main subject areas: Scope, status, and needs of radiation ecology. Radionuclide cycling. Ionizing radiation effects. Ecological techniques utilizing ionizing radiation. Nuclear war, waste disposal, and peaceful uses of nuclear energy. Appendix: selected bibliographies, proceedings, and books concerning radiation ecology.

The Enterprise, Wisconsin, Radiation Forest

Part 1: Preirradiation Ecological Studies

Editor: Thomas D. Rudolph, Institute of Forest Genetics, North Central Forest Experiment Station, Forest Service

U. S. Atomic Energy Commission, 1974. 155 pp., 9 by 11. Available from NTIS as TID-26113. Paper copy, $7.60. Microfiche, $3.00.

LC 74-600049

Part 2: Radioecological Studies

Editor: J. Zavitkovski, Institute of Forest Genetics, North Central Forest Experiment Station, Forest Service

Energy Research and Development Administration, 1977. 220 pp., 9 by 11.

Available from NTIS as TID-26113-P2. Paper copy, $7.50. Microfiche, $3.00.

LC 76-30437

A two-volume study of the effects of gamma radiation on a typical North American Forest Ecosystem at Enterprise Radiation Forest near Rhinelander, Wisconsin, jointly sponsored by the U.S. Department of Agriculture, Forest Service, and the U.S. Atomic Energy Commission. Part 1 describes the preirradiation physical and biological environments—including topography, climatic conditions, vegetation, and small-mammal populations. Predictions are made of the impact of irradiation on a typical northern forest during one growing season. Part 2 describes the effects of irradiation on the physical environment in the forest. Changes in light, temperature, relative humidity, and precipitation regimes under radiation-damaged forest canopies are quantified and related to changes in the understory vegetation. The effects of gamma radiation on lichens, herbs, shrubs, trees, and small mammals are described and are compared with predicted effects. This study will be of value to the ecologist and radioecologist and to persons concerned with the management of our northern forest resources.

CONTENTS:

Part 1. The Enterprise Radiation Forest Research Facility. Experimental plot design. Solar radiation measurements. Lichens. Flora. Classification of plant communities. Physical condition and dimensions of trees. Properties of the tree flora in the transition from aspen to maple–birch. Temporal and spatial patterns of pretreatment litter production. Leaf-litter production. Vertebrates: survey. Small-mammal populations. Predicted effects of chronic gamma irradiation. Index.

Part 2. Radiation patterns and dosimetry. Temperature and moisture regimes. Light distribution under gamma-irradiated aspen and maple–aspen–birch forests. Effects of chronic gamma radiation on the lichen Parmelia sulcata Tayl. Effects of gamma radiation on biomass production of ground vegetation. Response of a forest ecotone to ionizing radiation. Structural and floristic changes caused by gamma radiation in understory vegetation. Biomass and production regressions for trees and woody shrubs. Effects of gamma radiation on the biomass structure of the arboreal stratum. Radiosensitivity and recovery of tree crowns. Tree shoot elongation. Radial and shoot growth of five tree species. Phenology of selected herbaceous species. Effects of gamma radiation on vegetative and

reproductive phenology of herbaceous species. Tree phenology in a gamma-irradiated forest. Small mammals in a gamma-irradiated forest. Nesting avifauna under gamma-radiation exposure. Increase in radiosensitivity with increase in age of Populus tremuloides seed. Gas exchange, dry weights, and chlorophyll contents of Populus tremuloides seedlings grown from gamma-irradiated seeds. Summary. Index.

The Environment of Amchitka Island, Alaska

Editors: M. L. Merritt, Sandia Laboratories, and R. G. Fuller, Oracle, Arizona
Energy Research and Development Administration, in press. Estimated date of publication: spring 1977.

A description of Amchitka Island and its immediate surroundings, what is there, how the various parts of it fit together, and how they depend on one another. Prior to the underground nuclear explosive test Cannikin, which was conducted by the U. S. Atomic Energy Commission on Nov. 6, 1971, the AEC conducted a comprehensive program to provide base-line data against which the postshot data could be measured. During the course of these investigations, an impressive amount of new basic scientific knowledge has been developed about a comparatively little known region of the world. This book is not intended to be a report on the effects of the nuclear tests there, although these cannot entirely be omitted. Almost all the authors were deeply involved in the Amchitka program and write from personal experience. The intended audience is the general scientific community, especially but not exclusively biologists.

CONTENTS: Geographic setting. Geologic history. Hydrology. Weather and climate. Prehistoric human occupation of the Rat Islands. History, 1741–1967. Previous scientific investigations, 1867–1967. Geomorphology. Soils. Terrestrial plant ecology. Avifaunal investigations. Status of the Norway Rat. Limnology. Aquatic ecology. Fishery resources of the western Aleutians. Oceanography. Ecology of marine algae. Communities of benthic marine invertebrates. Marine fish communities. Sea mammals: resources and population. Population estimates and feeding behavior of sea otters. Ecologic interactions involving the sea otter. Sea otter metabolism and heat economy. Radionuclides in air, water, and biota. Polychlorinated biphenyls in the ecosystems. Ecological consequences of nuclear testing.

Environment of the Cape Thompson Region, Alaska

Editors: Norman J. Wilimovsky, University of British Columbia, and John N. Wolfe, Division of Biology and Medicine, U. S. Atomic Energy Commission
U. S. Atomic Energy Commission, 1966. 1250 pp., 7 by 10. Temporarily out of print. Estimated date of reprinting: summer 1977. Will be available from NTIS as PNE-481. Paper copy only, $9.25.
LC 66-60018

A composite study of various environmental parameters in a little known region of Arctic Alaska. This is a scientific report of many investigators on the physical environment and the biota and some of their interrelations, based on simultaneous investigations carried out from 1959 through 1962. It is the most comprehensive study of a single area of this size ever made in the Arctic.

Environmental Chemistry and Cycling Processes

(ERDA Symposium Series)

Editors: Domy C. Adriano and I. Lehr Brisbin, Savannah River Ecology Laboratory
Energy Research and Development Administration, in press. Estimated date of publication: winter 1977–1978.

Proceedings of a symposium held in Augusta, Ga., April 28–May 1, 1976, sponsored by Savannah River Ecology Laboratory, Institute of Ecology, University of Georgia; and Energy Research and Development Administration. These proceedings of the second SREL mineral cycling symposium emphasize studies of environmental chemistry and cycling of pollutants (both stable and radioactive) resulting from nuclear fuel cycles and nonnuclear energy production.

CONTENTS: Main subject areas: Design and sampling. Modeling applications. Analytical methods. Dispersal from point and nonpoint sources. Factors affecting elemental uptake by plants. The use of models in cycling studies. New techniques and analytical methods. Studies of elemental cycling in terrestrial ecosystems. Reaction, distribution, and transport in soils and sediments. Food-chain pathways. Studies of elemental cycling in aquatic ecosystems. Index.

The Environmental and Ecological Forum, 1971–1972

Coordinator: A. Burt Kline, Jr.

U. S. Atomic Energy Commission, 1972. 194 pp., 7 by 10. Available from NTIS as TID-25857. Paper copy, $3.00. Microfiche, $3.00.

LC 72-600120

Papers presented in the 1970–1971 Environmental and Ecological Forum series, which was planned to provide an overview of the significant environmental, social, and economic aspects of electric-power generation, more specifically, the pros and cons of nuclear power production, in the hope of building a communication bridge between the scientific community and the public. The authors are knowledgeable and articulate spokesmen whose concerns range widely across the multidisciplinary areas of technology, national policies, priorities, and their interrelationships.

CONTENTS: Man's conquest of energy: its ecological and human consequences. The nucs: energy vs. the environment. Nuclear power plants: present, past, and future. The radiation hazard for man. A proposal for a rational policy to control radioactivity and other forms of pollution. The public and radiation from nuclear power plants. Adequacy of present radiation standards. The nuclear power information communication predicament. Nuclear power licensing: risk–benefit determinations and public interest. Nuclear power: you never had it so good. Benefits and costs of nuclear power. What we do know about low-level radiation.

The Environmental Impact of Electrical Power Generation: Nuclear and Fossil

Pennsylvania Department of Education

U. S. Atomic Energy Commission, 1975. Student text, 244 pp., 9 by 11. Available from GPO as ERDA-69, $3.05. Teacher's guide, 25 pp., 9 by 11. Available from GPO as ERDA-70, $1.20.

A minicourse for secondary schools and adult education, designed to present an unbiased, straightforward, and objective view of the advantages and disadvantages of the methods of generating electrical power. The course attempts to capitalize on the discrepancies between the scientific and engineering principles behind power generating facilities and environmental protection problems. The course serves in two ways. First, it tries to provide information relative to power generation which may be useful in reducing the discrepancy. Second, it tries to maintain a certain level of discrepancy by not providing a comprehensive list of answers; instead it provides some information that may be useful in formulating such answers.

CONTENTS: The demand for electrical energy. Meeting the demand for electrical energy: Nuclear power plants. Fossil fueled electrical generating stations. Biological effects: a comparison. Wastes in the production of electrical power. Plant site considerations. Energy conservation: the need for more efficient use of energy. Appendixes for student's text: glossary of terms; a decision making model; licensing of nuclear power plants. Appendixes for teacher's guide: laboratory safety; environmental organizations; achievement test.

Environmental Toxicity of Aquatic Radionuclides: Models and Mechanisms

Editors: Morton W. Miller and J. Newell Stannard, Department of Radiation Biology and Biophysics, School of Medicine and Dentistry, University of Rochester

Ann Arbor Science Publishers, 1976. 349 pp., 6 by 9, $29.50.

LC 76-22227 ISBN 0-250-40132-0

Proceedings of the Eighth Rochester International Conference on Environmental Toxicity, June 2–4, 1975. This volume gives insight into the types of problems encountered in radionuclide toxicity and provides the scientific insights and questions of scientists expert in the field. Environmentalists, ecologists, and toxicologists will appreciate the analysis of the interrelationships between radionuclides and the environment, while health physicists and nutritionists will be interested in the effects of contaminated sea life on consumers. The discussion of regulatory and programmatic interests are especially pertinent to those in state and federal governmental agencies.

CONTENTS: Four main subject areas: Biogeochemistry of the transuranics in aqueous environments (6 papers). Modeling and measurements (3 papers). Model testing (3 papers). General ecological studies (2 papers). Panel discussion. Index.

Handbook on Aerosols

Editor: Richard Dennis, GCA Corporation

Energy Research and Development Administration, 1976. 148 pp., 9 by 11.
Available from NTIS as TID-26608. Paper copy, $6.00. Microfiche, $3.00.
LC 75-33965

A selective treatment of those physical and kinetic properties of aerosol systems which are fundamental to the solution of many particulate problems in both nuclear and nonnuclear industries. Several authors discuss key aspects of particulate behavior in the context of their applications in field and laboratory. The applications include ambient atmosphere and stack monitoring, assessment of size-related biological effects, development of high-efficiency control systems for waste-gas emissions, meteorological transport and dispersion of particulates, forecasting of pollution levels and visibility, commercial handling and production of fine particles, and compliance with the consistently more-stringent emission standards being set. The coverage is sufficiently broad to provide support to many diverse groups and activities. The handbook is directed to two major audiences: scientists and engineers directly responsible for the execution of research and development programs and administrative personnel whose responsibilities require a practical understanding of aerosol systems.

CONTENTS: Introduction: objectives, organization, and application. Aerosol generation. Dynamic behavior of aerosols. Optical properties of aerosols. Sampling and particle-size measurement. Summary tables and charts for static and dynamic characteristics of aerosol systems. Index.

Low-Level Radioactive Wastes: Their Handling, Treatment, and Disposal

C. P. Straub, Robert A. Taft Sanitary Engineering Center

U. S. Atomic Energy Commission, 1964. 430 pp., 6 by 9. Available from University Microfilms as OP55507. Xerographic copy, paper binding, $51.80. Microfilm, $17.30.
LC 64-60034

A book that brings together pertinent material that was scattered throughout many project reports and published literature relating to continuous operations. It was written for those interested in low-level waste disposal: the health physicist; the water- and sewage-works personnel concerned with the efficiency of water and sewage treatment processes for the removal of radioactive materials; the personnel engaged in the design, construction, licensing, and operation of treatment facilities; and the student of nuclear technology.

Meteorology and Atomic Energy—1968

Editor: David H. Slade, Environmental Science Services Administration

U. S. Atomic Energy Commission, 1968. 445 pp., 8 by 10. Available from NTIS as TID-24190. Paper copy, $6.00. Microfiche, $3.00.
LC 68-60097

A combination textbook and handbook providing much wider and deeper coverage than the 1955 edition. It reflects extensive research and offers a variety of useful equations, graphs, and other background materials necessary for computing atmospheric diffusion and radioactive dosage values.

Mineral Cycling in Southeastern Ecosystems

(ERDA Symposium Series)

Editors: Fred G. Howell, John B. Gentry, and Michael H. Smith, Savannah River Ecology Laboratory

Energy Research and Development Administration, 1975. 920 pp., 6 by 9.
Available from NTIS as CONF-740513. Paper copy, $13.60. Microfiche, $3.00.
LC 75-33463 (CIP)

Proceedings of a symposium held at Augusta, Ga., May 1–4, 1974, sponsored by the Savannah River Ecology Laboratory, the Institute of Ecology, University of Georgia, and the U. S. Atomic Energy Commission. One of the few comprehensive reports presently available in the field, this volume reflects in many ways the state of the art in mineral-cycling research. Most of the studies document and compare elemental concentrations in various ecosystem compartments, with emphasis on verification of techniques, documentation of data with statistically determined confidence intervals, interpretation of results, and synthesis leading to development of concepts for this area of ecology. Although the primary emphasis is on mineral cycling in the southeastern United States, work in other

geographic areas is also discussed.
CONTENTS: Four main subject areas: Models (11 papers). Marine and estuarine ecosystems (9 papers). Freshwater ecosystems (9 papers). Terrestrial ecosystems (37 papers). Index.

Plume Rise

(AEC Critical Review Series)
G. A. Briggs, Environmental Science Services Administration
U. S. Atomic Energy Commission, 1969. 81 pp., 7 by 10. Available from NTIS as TID-25075. Paper copy, $6.00. Microfiche, $3.00.
LC 72-603261
An overall view of the literature and a much needed addition to a field in which the meteorologist must choose from among 30 different plume-rise formulas in predicting atmospheric dispersion of effluents. The author develops a simple theoretical model and makes clear, practical recommendations on the basis of all available data.

Precipitation Scavenging (1970)

(AEC Symposium Series)
Coordinators: R. J. Engelmann, U. S. Atomic Energy Commission, and W. G. N. Slinn, Pacific Northwest Laboratory
U. S. Atomic Energy Commission, 1970. 508 pp., 6 by 9. Available from NTIS as CONF-700601. Paper copy, $6.00. Microfiche, $3.00.
LC 70-609397
Proceedings of a symposium held at Richland, Wash., June 1–5, 1970, sponsored by Pacific Northwest Laboratory, Battelle Memorial Institute, and the Fallout Studies Branch, Division of Biology and Medicine, U. S. Atomic Energy Commission. This conference, the first scientific meeting devoted exclusively to scavenging by precipitation, assesses the state of the art and provides a wide perspective of research and projects in the field. The papers cover experimental techniques and equipment, data from field and laboratory experiments, microphysics in scavenging, and models for predicting scavenging.

Precipitation Scavenging (1974)

(ERDA Symposium Series)
Coordinators: Richard G. Semonin, Illinois State Water Survey, and Robert W. Beadle, Energy Research and Development Administration
Energy Research and Development Administration, in press. Estimated date of publication: spring 1977. 856 pp., 6 by 9. Will be available from NTIS as CONF-741003. Paper copy, $10.50. Microfiche, $3.00.
LC 76-53788 (CIP)
Proceedings of a symposium held at Champaign, Ill., Oct. 14–18, 1974, sponsored by the Illinois State Water Survey and the U. S. Atomic Energy Commission. A sequel to "Precipitation Scavenging (1970)," this conference reflects a growing interest in the subject and an awareness that the problems involved cut across national boundaries and scientific disciplines. The papers present research from the fields of chemistry, biology, geology, meteorology, and oceanography.
CONTENTS: Seven main subject areas: Problems, approximate solutions, and suggestions for future research (1 paper). Scavenging ratios (2 papers). Sulfur dioxide scavenging research (6 papers). Microphysics: laboratory and theoretical (12 papers). Mesoscale field studies (11 papers). Regional studies (6 papers). Scavenging modeling (9 papers). Proposed terminology. Supplemental bibliography of publications by the symposium authors (compiled August 1976). Paper discussions. Index.

Radioactive Fallout from Nuclear Weapons Tests

(AEC Symposium Series)
Editor: Alfred W. Klement, Jr., U. S. Atomic Energy Commission
U. S. Atomic Energy Commission, 1965. 965 pp., 6 by 9. Available from NTIS as CONF-765. Paper copy, $6.00. Microfiche, $3.00.
LC 65-62945
Proceedings of a symposium held at Germantown, Md., Nov. 3–6, 1964, sponsored by the Fallout Studies Branch, Division of Biology and Medicine, U. S. Atomic Energy Commission. This conference presents research data on atmospheric radioactivity and fallout from nuclear weapons tests, including information useful for predicting fallout. Areas needing further detailed study are also discussed.

Radioactive Fallout, Soils, Plants, Foods, Man

Editor: Eric B. Fowler, University of California and Los Alamos Scientific Laboratory
Elsevier Publishing Co., 1965. 317 pp., 6 by 9. $19.25.
LC 65-13896 ISBN 0-444-40242-X

Reviews by competent contemporaries in the associated fields of research and philosophies concerning fallout, its relation to soils, plants, foods, animals, and man. There is an obvious repetition of certain referenced work that indicates its importance in a variety of fields of endeavor and reveals the interrelationship of problems. A serious effort has been made not to edit out differences of the respective authors, because differences lead to logical discussions and in turn to newer experimental design to obtain more nearly precise data.

Radioecology and Ecophysiology of Desert Plants at the Nevada Test Site

Arthur Wallace and Evan M. Romney, University of California, Riverside
U. S. Atomic Energy Commission, 1972. 446 pp., 6 by 9. Available from NTIS as TID-25954. Paper copy, $6.00. Microfiche, $3.00.
LC 72-60[illegible]10

Reports of a small portion of the biological work under way at the Nevada Test Site. This book is not designed as a comprehensive ecological or botanical treatise on the Test Site but rather as a base for future studies of radiation effects and radionuclide- and mineral-cycling problems of interest to the Atomic Energy Commission and for manipulation experiments of interest to the International Biological Program. The disciplines of soil science, plant nutrition, statistics, horticulture, and plant physiology have been brought to bear on the problems of ecology because such complex problems can be solved only by an interdisciplinary approach.

CONTENTS: Content and effects on soil, plants, and small mammals of various levels and kinds of radiation on or around the Nevada Test Site; characteristics of a variety of desert plants, including productivity, ecological attributes, ecotonal lines, root systems, seed germination, phenology, leaf forms, and age; effects on plants of decomposing leaves, an artificial stream, soil temperature, boron levels, nitrogen fertilizer and supplemental moisture, and salt; studies on leaf temperatures, cycling of stable cesium, interception of rain by shrub foliage, CO_2 and H_2O exchange, flood damage, nitrogen cycling, symbiotic nitrogen fixation, mineral element contents, stable-cesium analyses by neutron activation, mineral composition of leaves after washing, accumulation of lead in roadside plants, computer program for selecting sampling loci, and plant behavior; plans for studying radiation effects on plant populations. Nomenclature of plants. Extensive references.

Radioecology and Energy Resources

Editor: Colbert E. Cushing, Jr., Battelle, Pacific Northwest Laboratories
Dowden, Hutchinson & Ross, 1976. 422 pp., 9 by 11. Available from Halsted Press, $25.00.
LC 76-8348 (CIP) ISBN 0-87933-250-6

Proceedings of the Fourth National Symposium on Radioecology, Oregon State University, Corvallis, Oreg., May 12–14, 1975, sponsored by the Ecological Society of America, Oregon State University, and Energy Research and Development Administration. The symposium focused on the increasing role of nuclear energy in the total energy picture and on the radioecological implications of energy resource development. Participants at the symposium presented research findings relevant to the contemporary nuclear fuel economy, projections concerning potential energy sources and attendant radioecological problems, and examples of environmental problems of industry and resource development. The Ecological Society of America Special Publication No. 1.

CONTENTS: Five main subject areas: Plenary papers (2 papers). Radioecological problems associated with the development of energy sources (13 papers). Modeling and methodological contributions in environmental studies (12 papers). Cycling of radionuclides in aquatic and terrestrial ecosystems (21 papers). Radiation effects on terrestrial and aquatic organisms and communities (6 papers). Author–keyword index.

The Soil—Plant System in Relation to Inorganic Nutrition

(American Institute of Biological Sciences–U. S. Atomic Energy Commission Monograph)
M. Fried and H. Broeshart, International Atomic Energy Agency
Academic Press, 1967. 358 pp., 6 by 9, $19.50.
LC 66-30081 ISBN 0-12-268050-2

A monograph on mineral nutrition including soil chemistry and fertility. Topics discussed include nutrient movement from the soil into and through the soil solution, into the plant root, and into the shoot; nutrient supply and supplementation; and plant nutrient requirements and soil testing.

Sources of Tritium and Its Behavior upon Release to the Environment

(AEC Critical Review Series)

D. G. Jacobs, Oak Ridge National Laboratory

U. S. Atomic Energy Commission, 1968. 90 pp., 7 by 10. Available from NTIS as TID-24635. Paper copy, $6.00. Microfiche, $3.00.
LC 68-67209

A state-of-the-art study that reviews published information on tritium production and the pertinent factors that affect the behavior of tritium in the environment. Estimates are made for production and accumulation of tritium in an expanding nuclear power economy.

Survival of Food Crops and Livestock in the Event of Nuclear War

(AEC Symposium Series)

Editors: David W. Bensen, Office of Civil Defense, and Arnold H. Sparrow, Brookhaven National Laboratory

U. S. Atomic Energy Commission, 1971. 745 pp., 6 by 9. Available from NTIS as CONF-700909. Paper copy, $9.00. Microfiche, $3.00.
LC 77-170334

Proceedings of a symposium held at Brookhaven National Laboratory, Upton, Long Island, N. Y., Sept. 15–18, 1970, sponsored by the Office of Civil Defense, the U. S. Atomic Energy Commission, and the U. S. Department of Agriculture. This book reflects the results of several years of research and study to develop better understanding of the effects of fallout beta and gamma radiation on food crops and livestock. The many misconceptions and unfounded fears of the effects of fallout from nuclear weapons which persist—in particular, the catastrophic effects of nonlethal fallout irradiation and ^{90}Sr contamination of food—are not substantiated by the data in the proceedings. A major conclusion is that, although serious local shortages and damage to individual crops and herds would occur, crippling problems of postattack food contamination appear unlikely when the total resources that should be available to the nation are considered.

Thermal Ecology

(AEC Symposium Series)

Editors: J. Whitfield Gibbons and Rebecca R. Sharitz, Savannah River Ecology Laboratory, University of Georgia

U. S. Atomic Energy Commission, 1974. 687 pp., 6 by 9. Available from NTIS as CONF-730505. Paper copy, $13.60. Microfiche, $3.00.
LC 74-600136

Proceedings of a symposium held in Aiken, S. C., May 3–4, 1973, sponsored by the Savannah River Ecology Laboratory, the Savannah River Laboratory, and the U. S. Atomic Energy Commission. This symposium, the first to be held on thermal ecology, promoted interaction between researchers in universities, industries, and government and provided depth and diversity of coverage. The papers emphasize both the positive and negative aspects of man's treatment of thermal wastes. The book is of value to students and investigators conducting studies on biological responses in thermally stressed environments. Many of the papers are essential for thorough coverage and assessment of the environmental impact of thermal effluents to natural ecosystems.

CONTENTS: Nine main subject areas: Physiochemical phenomena (6 papers). Physiological ecology (4 papers). Thermal tolerance and adaptation (7 papers). Population ecology (9 papers). Behavioral ecology (5 papers). Community ecology (11 papers). Productivity (6 papers). Diversity (4 papers). Models (3 papers). Index.

Thermal Ecology II

(ERDA Symposium Series)

Editors: Gerald W. Esch, Wake Forest University, and Robert W. McFarlane, Savannah River Ecology Laboratory

Energy Research and Development Administration, 1976. 414 pp., 9 by 11. Available from NTIS as CONF-750425. Paper copy, $11.00. Microfiche, $3.00.
LC 76-28206 (CIP)

Proceedings of a symposium held in Augusta, Ga., Apr. 2–5, 1975, sponsored by Savannah River Ecology Laboratory; Institute of Ecology, University of Georgia; and Energy Research and Development Administration. These proceedings, for the second symposium on thermal ecology, present an overview of thermal ecology at the individual, population, and ecosystem levels of biological organization; research reports on specific plants, fish, and shellfish, as well as on communities and ecosystems; and reports of the environmental impact of electric power facilities, both nuclear and fossil fueled.

CONTENTS: Seven main subject areas: Thermal ecology—an overview (4 papers). Temperature and physiological parameters (13 papers). Thermal tolerance (9 papers). Temperature and fish behavior (5 papers). Populations, communities, and ecosystems (14 papers). Environmental impact of electric power facilities (3 papers). Impingement, entrainment, and electric power facilities (9 papers). Index.

A Tropical Rain Forest: A Study of Irradiation and Ecology at El Verde, Puerto Rico

(In three volumes)

Editors: Howard T. Odum, University of North Carolina,
and Robert F. Pigeon, U. S. Atomic Energy Commission

U. S. Atomic Energy Commission, 1970. 1652 pp., 8 by 11. Available from NTIS as TID-24270(PRNC-138). Paper copy only, $10.00 per set of three volumes.
LC 70-606844

An intensive ecological study of several acres of mountain rain forest on the side of El Yunque in the Luquillo National Forest in eastern Puerto Rico. The operation of the normal forest was studied and compared with a zone that received 3 months of stress from gamma irradiation of a 10,000-curie cesium source that was airlifted into the forest. The book reports the scientific results of the project, which used many techniques of systems ecology in the quest of understanding one of the most complex ecosystems on earth. Included in nine main divisions (111 chapters) are the documentation of maps, tables of tree numbers, and taxonomic keys to facilitate new efforts at the El Verde site toward finding the best designs for man and nature in the broad tropical lands of the earth. Complete index in each volume.

Universities, National Laboratories, and Man's Environment

Argonne Universities Association

U. S. Atomic Energy Commission, 1969. 167 pp., 7 by 10. Available from NTIS as CONF-690705. Paper copy, $6.00. Microfiche, $3.00.
LC 70-603606

An account of the speeches given at a conference held in Chicago, July 27–29, 1969, to discuss how universities, government, and industry can work together to solve environmental problems. The conference had two subtitles: Is Man on His Way to Extinction—Is It a Natural Process? and Organizing to Understand and Shape Man's Environmental Interactions. The main topic was the desirability and the feasibility of establishing a sociotechnological research organization to study large-scale environmental problems. The conclusion was that a pooling of resources was necessary because of the importance, urgency, and complexity of the problems society faces. Principal speakers were Rene Dubos, Elvis Stahr, Melvin Price, John L. Buckley, James T. Ramey, Laura Fermi, Chet Holifield, Henry S. Rowen, Fred H. Harrington, and Lawrence R. Hafstad.

Vascular Plants of the Nevada Test Site and Central-Southern Nevada: Ecologic and Geographic Distributions

Janice C. Beatley, Laboratory of Nuclear Medicine and Radiation Biology, University of California, Los Angeles

Energy Research and Development Administration, 1976. 316 pp., 6 by 9. Available from NTIS as TID-26881. Paper copy, $9.75. Microfiche, $3.00.
LC 76-21839 (CIP)

A description of the desert environment and vegetation of the Nevada Test Site and central-southern Nevada. The region is of extraordinary biological interest because it straddles the boundaries of two large deserts and is characterized by conspicuous biological

and environmental contrasts and transitions. The presentation makes available plant-collection data gathered from 1959 through 1974 and provides a record of the taxa in central-southern Nevada, where each occurs, and in what kind of vegetation it occurs. The approach is environmental rather than evolutionary.
CONTENTS: Part I: The Desert Environment and Vegetation. The physical environment. The vegetation. Part II: The Vascular Plants. Ecologic and geographic distributions. Index to families, genera, and species.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

Chemist–Meteorologist Workshop—1975
A Report of Discussions and Recommendations
Ft. Lauderdale, Fla. Jan. 13–17, 1975. Sponsored by Energy Research and Development Administration. 1975. 102 pp. Available from NTIS as ERDA-1217-75.

The Environmental Impact of Water Chlorination, Proceedings of the Conference on
Oak Ridge, Tenn. Oct. 22–24, 1975. Sponsored by Oak Ridge National Laboratory, Energy Research and Development Administration, and U. S. Environmental Protection Agency. 1976. 451 pp. Available from NTIS as CONF-751096.

National Environmental Research Park Symposium
Idaho Falls, Idaho. Oct. 22, 1974. Sponsored by College of Idaho, Idaho Nuclear Energy Commission, and U. S. Atomic Energy Commission. 1974. 62 pp. Available from NTIS as CONF-741053.

Nuclear Methods in Environmental Research, Second International Conference on
Columbia, Mo. July 29, 1974. Sponsored by Energy Research and Development Administration, American Nuclear Society, and University of Missouri. 1974. 479 pp. Available from NTIS as CONF-740701.

Social Consequences of Waste Heat Discharge Alternatives, Proceedings of Workshop on
Argonne, Ill. June 9–10, 1975. Sponsored by Energy Research and Development Administration. 1975. 43 pp. Available from NTIS as CONF-750692.

RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Bioenvironmental Effects Associated with Nuclear Power Plants, A Selected Bibliography, First Addendum
Battelle Columbus Laboratories. June 1974. 402 pp. Available from NTIS as BMI-X-654.

Chemistry and Effects of Chlorine in Aquatic Systems, A Selected, Annotated Bibliography
Oak Ridge National Laboratory. March 1976. 67 pp. Available from NTIS as ORNL-EIS-82.

Cooling Towers, A Bibliography
ERDA Technical Information Center. May 1976. 90 pp. 905 references. Available from NTIS as TID-3360.

Environmental Aspects of Plutonium and Other Elements: A Selected, Annotated Bibliography
Oak Ridge National Laboratory. February 1974. 279 pp. Available from NTIS as ORNL-EIS-74-21 (Suppl. 2). (Bibliographies on this subject for previous years are also available.)

Environmental Aspects of the Transuranics: A Selected, Annotated Bibliography
Oak Ridge National Laboratory.
December 1974. 236 pp. Available from NTIS as ORNL-EIS-74-21(Suppl. 3).
October 1974. 246 pp. Available from NTIS as ORNL-EIS-74-21(Suppl. 4).
June 1975. 234 pp. Available from NTIS as ORNL-EIS-74-21-5.
July 1975. 196 pp. Available from NTIS as ORNL-EIS-75-21-6.
July 1976. 204 pp. Available from NTIS as ORNL-EIS-91.

Environmental Studies at the Savannah River Plant and Immediate Environs
ERDA Technical Information Center. July 1975. 99 pp. Available from NTIS as TID-3353.

Environmental Transport of Chemicals
Oak Ridge National Laboratory. May 1974. 187 pp. Available from NTIS as ORNL-EIS-74-68.

Heavy Metals and Other Trace Elements in Aquatic Environments
Oak Ridge National Laboratory. September 1974. 159 pp. Available from NTIS as ORNL-EIS-74-69.

Monitoring, Control, and Disposal of Tritium
USAEC Technical Information Center. May 1973. 103 pp. Available from NTIS as TID-3337.

Radionuclide Movement in Soils and Uptake by Plants, A Selected, Annotated Bibliography
Oak Ridge National Laboratory. August 1975. 371 pp. Available from NTIS as ORNL-EIS-75-77.

San Francisco Bay and Delta System: A Selected Bibliography
Lawrence Livermore Laboratory. June 1975. 486 pp. Available from NTIS as UCRL-51943.

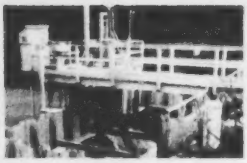
Terrestrial, Freshwater, and Marine Radiation Ecology, Selected Bibliography of
Washington State University and Colorado State University.
1971. 185 pp. Available from NTIS as TID-25650.
1975. 240 pp. Available from NTIS as TID-25650-S1.

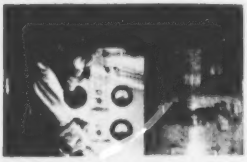
Terrestrial and Freshwater Radioecology
Washington State University.
1974. 125 pp. Available from NTIS as TID-3910(Suppl. 9).
1975. 124 pp. Available from NTIS as TID-3910-S10.
1975. 67 pp. Available from NTIS as TID-3910-S11.
(Bibliographies on this subject for previous years are also available.)

Thermal Effects on Aquatic Organisms, Annotated Bibliography of 1974 Literature
Oak Ridge National Laboratory. June 1975. 168 pp. Available from NTIS as ORNL-EIS-75-28. (Bibliographies on this subject for previous years are also available.)

Transport of Hazardous Substances Through Soil Processes
Oak Ridge National Laboratory.
Volume 1: Arsenic, Beryllium, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Selenium, Zinc, and Others
November 1974. 153 pp. Available from NTIS as ORNL-EIS-74-70(Pt. 1).
Volume 2: Pesticides
November 1974. 277 pp. Available from NTIS as ORNL-EIS-74-70(Pt. 2).

Tritium: Its Sources and Projections, Behavior, Measurement and Monitoring Techniques, Health Physics Aspects, and Waste Management: Indexed Bibliography on
Oak Ridge National Laboratory. August 1975. 638 pp. Available from NTIS as ORNL-5057.





HEALTH AND SAFETY

Accelerator Health Physics

H. Wade Patterson and Ralph H. Thomas, Lawrence Berkeley Laboratory
Academic Press, 1973. 668 pp., 6 by 9, $22.50.
LC 73-9443 (CIP) ISBN 0-12-547150-5

A distillation of almost 50 years of the authors' combined experience in working with accelerators. This experience is backed by their considerable familiarity with training in accelerator health physics in connection with the USAEC Special Fellowship Program and the Berkeley Accelerator Health Physics Training Course. Although general principles are emphasized, material necessary for a clear understanding of accelerator radiation problems unfamiliar to the average health physicist has been brought together in convenient form for the first time. These data are supplemented by a comprehensive bibliography.

CONTENTS: Fundamental particles and their interactions with matter. Radiation fields: their specification and measurement. Particle accelerators and their radiation environments. Human response to ionizing radiation. The measurement of radiation fields—radiation detectors. Accelerator shielding. Induced activity at accelerators. Administration of an accelerator health physics program. Appendix: laboratory manual. Index.

Aerosol Technology in Hazard Evaluation

(American Industrial Hygiene Association—U. S. Atomic Energy Commission Monograph)
Thomas T. Mercer, Department of Radiation Biology and Biophysics,
University of Rochester
Academic Press, 1973. 394 pp., 6 by 9, $24.50.
LC 72-12189 ISBN 0-12-491150-1

An exposition of the techniques used to measure and produce toxic aerosols. The presentation emphasizes the importance of measuring the distribution of toxic material as a function of the dynamic characteristics responsible for the deposition of particles in the respiratory tract. Techniques fall into two categories: the techniques for measuring concentration, size distribution, and respirable fractions and the techniques for producing monodisperse or polydisperse aerosols for instrument calibration and studies in experimental inhalation. The book compares the theoretical aspects of each technique with existing experimental data and gives the appropriate instrumentation for its applications. Industrial hygienists and physicians, inhalation toxicologists, health physicists, environmental scientists, and others seeking to evaluate the hazards of inhaling toxic particles will find this book of great value.

CONTENTS: Introduction. Properties of aerosols. Particle size and size distribution. Measurement of concentration. Sampling for geometric size measurement. Measurement of aerodynamic diameter. Measurement of other diameters related to particulate properties. Respirable activity samplers. Special problems. Glossary.

Applied Radiation Protection and Control

(In two volumes)

J. J. Fitzgerald, Cambridge Nuclear Corporation

Gordon and Breach, 1970. 1012 pp., 6 by 9. Available from American Nuclear Society, $62.70 per set of two volumes.

LC 65-27846

A handbook written to help students and professional radiological specialists obtain a broad view of radiation protection and control methods. The chapters can be used independently of each other. Some original experimental results are included, and administrative information on providing a program of safety is outlined. Though directed primarily to first- and second-year graduate students in engineering science and health physics, students in physics and reactor technology will also find portions of the text useful. A knowledge of nuclear physics and mathematics up to and including differential equations and vector analysis is assumed.

Assessment of Airborne Particles: Fundamentals, Applications, and Implications to Inhalation Toxicity

Editors: Thomas T. Mercer, Paul E. Morrow, and Werner Stöber, Department of Radiation Biology and Biophysics, School of Medicine and Dentistry, University of Rochester

Charles C Thomas, Publisher, 1972. 540 pp., 7 by 10, $32.75.

LC 73-161176

Proceedings of the Third Rochester International Conference on Environmental Toxicity, June 18–20, 1970. The conference was designed to bring together the latest information in the field, to stimulate additional research on the relation between aerosol properties and toxicity, and to provide information for more efficient planning of future research.

CONTENTS: Five main subject areas: Aerosol fundamentals (7 papers). Aerosol production and measurement (4 papers). Size analysis and shape factors (5 papers). Disposition of inhaled aerosols (6 papers). Assessment of hazardous aerosols (5 papers). Author and subject indexes.

Beryllium: Its Industrial Hygiene Aspects

(American Industrial Hygiene Association—U. S. Atomic Energy Commission Monograph)

Editor: H. E. Stokinger, U. S. Public Health Service

Academic Press, 1966. 394 pp., 6 by 9, $14.50.

LC 66-14894 ISBN 0-12-671850-4

A detailed account of how beryllium and its compounds can be handled safely and what engineering controls are needed in each operation or circumstance. Much previously unreported work is included. Consolidation of information, supplemented by extensive references to the original reports appearing in the literature, makes this work an important contribution to the reference library of those interested in all phases of environmental health.

Fundamental and Applied Aspects of Nonionizing Radiation

Editors: Solomon M. Michaelson, Morton W. Miller, Richard Magin, and Edwin L. Carstensen, Department of Radiation Biology and Biophysics, School of Medicine and Dentistry, University of Rochester

Plenum, 1975. 486 pp., 7 by 10, $39.50.

LC 75-33698 (CIP) ISBN 0-306-30901-7

Proceedings of the Seventh Rochester International Conference on Environmental Toxicity, held at Rochester, N. Y., June 1974. Nonionizing radiant energies such as microwaves and ultrasound are used in all sectors of our society for military, industrial, telecommunication, medical, and consumer applications. The goal of the conference was to assess the biomedical effects of radiant energies so that the worker or general public will not be unduly exposed and so that the research, development, and beneficial use of radiant energy will not be hampered or restricted by an undue concern for effects that may be nonexistent or minimal in comparison to other environmental hazards.

CONTENTS: Seven main subject areas: Biophysics and dosimetry (4 papers). Energy absorption (3 papers). Microwaves—biological effects (2 papers). Ultrasound—biological effects (4 papers). Medical applications (4 papers). Occupational aspects (3 papers). Future applications and controls (3 papers). Index.

The Health Effects of Plutonium and Radium

Editor: Webster S. S. Jee, College of Medicine, University of Utah
J. W. Press, 1976. 816 pp., 9 by 11, $20.00.

Proceedings of the symposium held at Sun Valley, Idaho, Oct. 6–9, 1975. Information on the effects of radiation on animals is offered for the study of radiation effects on man. The limited amount of human data on plutonium in contrast to the relative wealth of radium patient information is noted as well as the relative lack of data on toxic substances other than plutonium and radium.

CONTENTS: Introduction. Data retrieval (1 paper). Plutonium in animals (17 papers). Plutonium in man (9 papers). Radium in animals (2 papers). Radium in man (7 papers). Plutonium and radium relationships (4 papers). Bone and bone marrow as target tissues (6 papers). Cancer models (7 papers). High LET effects (4 papers).

Health Protection of Radiation Workers

W. Daggett Norwood, Hanford Environmental Health Foundation
Charles C Thomas, Publisher, 1975. 468 pp., 6 by 9, $27.50.
LC 74-12059 (CIP) ISBN 0-398-03291-2

Summary of essential information on health protection of radiation workers. This book provides basic facts on ionizing radiation, its measurement and dosimetry. Acute and chronic somatic and genetic effects are discussed with emphasis on prevention. Diagnosis and treatment of radiation injury from external radiation and/or internally deposited radionuclides are considered generally as well as specifically for each radioisotope. Radiation protection standards and regulations, medical supervision of radiation workers, radiation accidents, atomic power plants, and medicolegal problems are also covered. Addressed to physicians and nurses, teachers, health physicists, occupational hygienists, public health officers, safety specialists, and biologists, the book will also help to educate the public as to the hazards of radiation.

CONTENTS: Basic facts about radiation. Measurement of ionizing radiation. Radiation dosimetry: effectiveness of absorbed dose. General biological effects of ionizing radiation. Somatic effects of radiation, the acute radiation syndrome. Somatic effects of radiation other than those due to the acute radiation syndrome. Hereditary effects of radiation. Radiation protection standards and regulations. Radiation protection. Medical supervision of radiation workers. General methods of diagnosis and treatment of deposited radionuclides. Metabolism and health problems of some radioisotopes. Plutonium and other transuranium elements. Radiation accidents emergency plans and medical care. Atomic power plants. Medicolegal problems. Index.

Ichiban: Radiation Dosimetry for the Survivors of the Bombings of Hiroshima and Nagasaki

(ERDA Critical Review Series)

John A. Auxier, Oak Ridge National Laboratory
Energy Research and Development Administration, 1976. 128 pp. (est.), 7 by 10.
Available from NTIS as TID-27080. Paper copy, $4.75. Microfiche, $3.00.
LC 76-30780(CIP)

A history of radiation dosimetry as it evolved from studies of the Atomic Bomb Casualty Commission to determine the radiation doses received by survivors of the bombings of Hiroshima and Nagasaki. This book gives a general understanding of the problems confronted and the results of the various studies. From these results can be derived reasonable estimates of allowable, low-level acute exposures and, in conjunction with other studies, a yardstick for chronic exposure effects.

CONTENTS: Early studies. Early dosimetry experiments and the Ichiban Project. Early liaison studies in Japan (1957). Dosimetry experiments during Operation Plumbbob (1957). Dosimetry studies during Operation Hardtack (1958). Operation BREN (1961–1962). The nuclear archaeology of Japan. Development of system of tentative doses designated T65D. Dose distributions in Japanese-type houses. Heavily shielded and "Black Rain" survivors. Continuing studies. References. Appendixes. Index.

Impact of Energy Production on Human Health: An Evaluation of Means for Assessment

(ERDA Symposium Series)

Editors: Ernest C. Anderson and Elizabeth M. Sullivan, Los Alamos Scientific Laboratory

Energy Research and Development Administration, 1976. 152 pp., 9 by 1'

Available from NTIS as CONF-751022. Paper copy, $6.75. Microfich , $3.00.

LC 76-22540 (CIP)

Proceedings of the Los Alamos Scientific Laboratory Third Life Sciences Symposium, Los Alamos, N. Mex., Oct. 15–17, 1975, sponsored by the Los Alamos Scientific Laboratory and the Energy Research and Development Administration. The papers evaluate the means used to assess the impact of energy production on human health as a result of expanded national energy production.

CONTENTS: Four main subject areas: Overviews of the problems (3 papers). Review of standards setting (4 papers). Sources of information (8 papers). Special problems (2 papers). Paper discussions. Panel discussion. Index.

Luminescence Dosimetry

(AEC Symposium Series)

Editor: Frank H. Attix, U. S. Naval Research Laboratory

U. S. Atomic Energy Commission, 1967. 532 pp., 6 by 9. Available from NTIS as CONF-650637. Paper copy, $6.00. Microfiche, $3.00.

LC 67-60038

Proceedings of a symposium held at Stanford University, Stanford, Calif., June 21–23, 1965, sponsored by Stanford University, the Office of Naval Research, and the U. S. Atomic Energy Commission. Researchers working with radiation dosimetry systems based on luminescence phenomena from 14 countries share ideas and information.

Mathematical Theory of Radiation Dosimetry

J. J. Fitzgerald, G. L. Brownell, and F. J. Mahoney, Cambridge Nuclear Corporation

Gordon and Breach, 1967. 747 pp., 6 by 9. Available from American Nuclear Society, $38.00.

LC 65-27846

A book that will fill the need for a text in mathematical techniques for the training of health physicists. It will also serve as a reference book in dosimetry computations for practicing health physicists, meteorologists, and radiological engineers.

Medical Aspects of Radiation Accidents

Eugene L. Saenger, University of Cincinnati, Cincinnati General Hospital

U. S. Atomic Energy Commission, 1963. 376 pp., 6 by 9. Available from NTIS as TID-18867. Price schedule on page iii.

A presentation of the pertinent, tested, and useful information needed by anyone faced with a radiation emergency. The health physicist and the physician will have easy reference to the factual material provided. Presented first are the simplest instructions; these are then elaborated with the rules governing them in the next section. Following sections examine various possibilities of radiation accidents with a discussion of the technique for coping with each problem.

Nuclear Criticality Safety Short Course

Editor: R. Douglas O'Dell, University of New Mexico

U. S. Atomic Energy Commission, 1974. 180 pp., 9 by 11. Available from NTIS as TID-26286. Paper copy, $7.60. Microfiche, $3.00.

LC 74-600168

Proceedings of a one-week short course in nuclear criticality safety, held May 7–11, 1973, at the University of New Mexico's D. H. Lawrence Ranch. The course introduces the underlying principles and reviews the state of the art of nuclear criticality safety as well as records discussions and work sessions on topics of current importance and interest. This book will be of value to all those directly or indirectly responsible for or interested in the criticality safety of facilities involved with radioactive materials.

CONTENTS: Nine lecture papers, eight work-discussion sessions, and two panel discussions. Topics include the nature of fission and the criticality process, principles of safety, consequences of criticality accidents, contingencies and risk control, criticality experiments, data, and computations, generic array criticality, establishing subcritical limits, interpretation of Monte Carlo results, procedures and practices, operator training, process management, mixed oxides and actinides, shielded facilities, fire protection, transportation problems, licensing, and regulations and standards. Index.

Particle Size Analysis in Industrial Hygiene

(American Industrial Hygiene Association—U. S. Atomic Energy Commission Monograph)
Leslie Silverman, Harvard University School of Public Health,
Charles E. Billings, Billings and Gussman, Inc., and Melvin W. First,
Harvard University School of Public Health
Academic Press, 1971. 331 pp., 6 by 9, $26.50.
LC 73-154376 ISBN 0-12-643750-5

A monograph of value to all professional workers in the environmental sciences as an authoritative and compact guide to the tools and techniques of sizing fine particulate matter of biological significance. This book covers methods used in industrial hygiene, health physics, and air-pollution control for particle sampling and size analysis of solid and liquid airborne matter, fine bulk powders, and particle deposits in tissues. It includes discussions of particle properties of importance for direct (e.g., microscopic) and indirect (e.g., sedimentary) analytical methods, automatic sizing devices, and sizing data processing and interpretation. The authors concentrate on techniques associated with health and safety problems arising from particulate use and exposure and emphasize the range of application and utility of these techniques. They include sufficient details of practice to show the reader how to obtain a representative sample of airborne or deposited material and how to prepare realistic and reliable analyses.

Principles of Radiation Protection: A Textbook of Health Physics

Editors: K. Z. Morgan and J. E. Turner, Oak Ridge National Laboratory
John Wiley & Sons, 1967. 622 pp., 6 by 8. Available from Krieger, $15.95.
LC 67-22415 ISBN 0-088275-128-X.

A valuable textbook and reference book in the field of health physics. Written by highly regarded health physicists, this book covers every aspect of the problems of radiation protection.

Public Safety and Underground Nuclear Detonations

Samuel Glasstone
U. S. Atomic Energy Commission, 1971. 276 pp., 6 by 9. Available from NTIS as TID-25708. Price schedule on page iii.

A description of the comprehensive safety program carried out by the U. S. Atomic Energy Commission. The book was prepared through the coordinated effort of government agencies and contractors; the work of many competent scientists in a number of related disciplines is presented.

Respiratory Protection: OSHA and the Small Businessman

Walter E. Ruch, National Institute of Occupational Safety and Health,
and Bruce J. Held, U. S. Atomic Energy Commission
Ann Arbor Science Publishers, 1975. 102 pp., 6 by 9, $12.50.
LC 75-7955 ISBN 0-250-40101-0

A guide to provide the small businessman with information first to protect the health of his employees through respiratory protection and second to comply with the rules and regulations of the federal government and the states in the area of respiratory protection. Broad guidelines are provided for the planned use of respirators for protection against airborne contaminants such as gases, mists, particulates, vapors, or any other material not normally found in clean, fresh air.

CONTENTS: Introductory remarks. Breathing and the lungs. Classification of respiratory hazards. Evaluation of respiratory hazards. Particulate sampling. Basic requirements of OSHA. Types and limitations of respiratory protection devices. Other considerations. Respirator selection. Fitting. Training. Administration. Medical supervision. Respirator maintenance and care.

Thorium: Its Industrial Hygiene Aspects

(American Industrial Hygiene Association—U. S. Atomic Energy Commission Monograph)
R. E. Albert, Medical Center, New York University
Academic Press, 1966. 222 pp., 6 by 9, $10.00.
LC 66-29428

A summarization of the major technical uses of thorium, the hazards common to the various industrial processes, the techniques and objectives for the control of these hazards, and the biological and medical foundations on which these hazard controls are based.

RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Carcinogenicity of Residual Fuel Oils by Nonbiological Laboratory Methods: An Annotated Bibliography
Part 1: Laboratory Methods of Analysis. Part 2: Analysis Results
Atomics International Division, Golden, Colo. Apr. 9, 1976. 16 pp. Available from NTIS as RFP-2436.

Nuclear Power: Accident Probabilities, Risks, and Benefits, A Bibliography
Oak Ridge National Laboratory. February 1976. 138 pp. Available from NTIS as ORNL-NSIC-123.

Occupational Health Aspects of Uranium
ERDA Technical Information Center. Estimated date of publication: winter 1976–1977. Will be available from NTIS as TID-3352.

[Reactor and Weapons Radiation Shielding] Bibliography, Subject Index, and Author Index of the Literature Examined by the Radiation Shielding Information Center
Oak Ridge National Laboratory. March 1974. 554 pp. Available from NTIS as ORNL-RSIC-5(Vol. 4).

Uranium Tailings Bibliography
Oak Ridge National Laboratory. December 1975. 97 pp. Available from NTIS as ORNL-5109.

ISOTOPE SEPARATION

Chemical Separation of the Uranium Isotopes

(National Nuclear Energy Series, Division III, Volume 3)

Clyde A. Hutchison, Jr., Columbia University

U. S. Atomic Energy Commission, 1952. 178 pp., 6 by 9. Available from NTIS as TID-5224: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A description of studies made at Columbia University to find a two-phase system suitable for countercurrent fractionation of the uranium isotopes.

Developments in the Centrifuge Separation Project

(National Nuclear Energy Series, Division X, Volume 1)

J. W. Beams, University of Virginia, A. C. Hagg, Westinghouse Electric Corp., and E. V. Murphree, Standard Oil Development Company

U. S. Atomic Energy Commission, 1951. 269 pp., 6 by 9. Available from NTIS as TID-5230: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A discussion of the development programs undertaken to devise a gas-centrifuge process for concentrating ^{235}U in UF_6, the theory of separation with cascades of identical counter-current units, early work at the University of Virginia, and the 42- and 132-in. centrifuges developed at Westinghouse and their operation.

Electromagnetic Separation of Isotopes in Commercial Quantities

(National Nuclear Energy Series, Division I, Volume 4)

Editors: R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory

U. S. Atomic Energy Commission, 1949. 434 pp., 6 by 9. Available from University Microfilms as OP10889: Xerographic copy, paper binding, $50.90. Microfilm (35 mm), $17.00. Also available from Microforms International: Microfilm (16 mm), $15.00.

A complete picture of the history and development of electromagnetic isotope separation.

Liquid Thermal Diffusion

(National Nuclear Energy Series, Division IX, Volume 1)

Editors: Philip H. Abelson, Carnegie Institution of Washington, D. C., Nathan Rosen,

University of North Carolina, and John I. Hoover, Naval Research Laboratory
U. S. Atomic Energy Commission, 1958. 258 pp., 6 by 9. Available from NTIS as TID-5229: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.
A description of the liquid thermal-diffusion method for the separation of isotopes.

Separation of the Boron Isotopes

(National Nuclear Energy Series, Division III, Volume 5)
Editor: George M. Murphy, New York University
U. S. Atomic Energy Commission, 1952. 469 pp., 6 by 9. Available from NTIS as TID-5227: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $11.00.
A description of the results of preliminary work on isotope separation to obtain a large quantity of crystalline boron, including a quantity containing at least 90% ^{10}B.

Separation of Isotopes in Calutron Units

(National Nuclear Energy Series, Division I, Volume 7)
Editor: H. Wesley Savage, Carbide and Carbon Chemicals Company
U. S. Atomic Energy Commission, 1951. 437 pp., 6 by 9. Available from University Microfilms as OP33500: Xerographic copy, paper binding, $51.00. Microfilm (35 mm), $17.00. Also available from Microforms International: Microfilm (16 mm), $15.50.
A description of the development of the operating units and their functions in the electromagnetic process of uranium-isotope separation.

The Theory of Isotope Separation as Applied to the Large-Scale Production of ^{235}U

(National Nuclear Energy Series, Division III, Volume 1B)
Karl Cohen, The H. K. Ferguson Company
McGraw-Hill, 1951. 165 pp., 6 by 9. Available from University Microfilms as OP6234: Xerographic copy, paper binding, $20.90. Microfilm (35 mm), $7.00. Also available from Microforms International: Microfilm (16 mm), $10.00.
A description of work done by the theoretical division of the Substitute Alloy Materials Laboratories, with emphasis placed on the general principles and concepts of the separation of uranium isotopes by gaseous diffusion.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

Uranium Enrichment Conference
Oak Ridge, Tenn. Feb. 13, 1975. Sponsored by Energy Research and Development Administration in cooperation with Union Carbide Corporation. 1975. 105 pp. Available from NTIS as CONF-750209.

Uranium Enrichment Conference
Oak Ridge, Tenn. Nov. 11, 1975. Sponsored by Energy Research and Development Administration. 1975. 116 pp. Available from NTIS as CONF-751134.

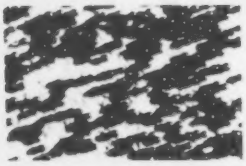
Uranium Enrichment Conference for Foreign Contractors
Oak Ridge, Tenn. Feb. 28, 1975. Sponsored by Energy Research and Development Administration in cooperation with Union Carbide Corporation. 1975. 87 pp. Available from NTIS as CONF-750210.

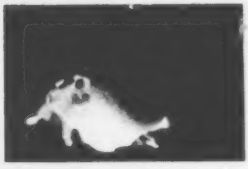
Uranium Enrichment Conference on Modified Contract Option
Oak Ridge, Tenn. July 22, 1975. Sponsored by Energy Research and Development Administration. 1975. 50 pp. Available from NTIS as CONF-750735.

RECENT AND RELEVANT BIBLIOGRAPHY

(For volumes available from NTIS, see price schedule on page iii.)

Uranium Isotope Separation
ERDA Technical Information Center. 1975. 120 pp. Available from NTIS as TID-3347 R.





METALLURGY AND MATERIALS

Adhesives for Metals: Theory and Technology

Nicholas J. DeLollis, Sandia Corporation
Industrial Press, 1970. 230 pp., 6 by 9, $18.00.
LC 74-107875 ISBN 0-8311-1001-5

A thoroughgoing survey of factors involved with adhesion, adhesive chemistry, and materials and bonding practice. The book describes the various theories of adhesion and provides a new outlook on the mechanism of bond failure. It also covers the concepts of cleanliness, joint design, stress relief, and vibration damping. One of the book's main contributions is an approach to the theories of adhesion showing how the mechanism of bond failure is influenced by the initial forces of adhesion. Also emphasized is the importance of adhesive sealants in stress relief and vibration damping applications—an area that is usually ignored. Keyed references to additional material are included for anyone interested in further pursuing any particular aspect of the subject. Since the book purposely avoids abstract symbolism, it should be easily understood by materials and production engineers at the practical applications level. At the same time, the book gives a well-rounded picture of adhesive bonding.

Advanced Techniques in Powder Metallurgy

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
Frances Clark, Stevens Institute of Technology, Hoboken, N. J.
Rowman and Littlefield, 1963. 180 pp., 6 by 9. Available from American Nuclear Society, $5.35.
LC 63-10996

A presentation of advanced techniques which treats the characteristics of powders from the standpoint of specific properties, discusses these metal powders used without consolidation, and suggests new methods of consolidating metal powders.

Alkali Metal Handling and Systems Operating Techniques

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)
J. W. Mausteller, S. J. Rodgers, and F. Tepper, MSA Research Corporation
Gordon and Breach, 1967. 247 pp., 6 by 9. Available from American Nuclear Society, $10.50.
LC 67-26578

A presentation of practical information essential to operations with alkali metals in high-temperature processes in which the metals are in the liquid state. General characteristics of alkali metals and purification and analysis are discussed in depth, along with handling and operational procedures.

Boiling Liquid-Metal Heat Transfer

(American Nuclear Society–Energy Research and Development Administration Monograph)
Orrington E. Dwyer, Brookhaven National Laboratory
American Nuclear Society, 1976. 448 pp. (est.), 6 by 9, $37.95.
LC 75-11012

A summary of the technical status of boiling liquid-metal heat transfer. The book is written primarily for researchers, design engineers, and graduate students in nuclear, chemicel, and mechanical engineering. Five of the six chapters deal with pool-boiling heat transfer. Much of the information is based on sodium, but considerable information on mercury, potassium, rubidium, and cesium is also given. The theoretical aspects of boiling, which are the same for liquid metals, are liberally presented for all the major topics.

CONTENTS: Incipient-boiling superheats with liquid metals. Growth rates of spherical bubbles in superheated liquid. The ebullition process in nucleate boiling of liquid metals. Nucleate-boiling heat transfer in pool boiling of liquid metals. Film-boiling heat transfer in pool boiling of liquid metals. Critical heat flux in nucleate pool boiling of liquid metals. Nomenclature. Appendixes. Author and subject indexes.

Ceramic Fuel Elements

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
Robert B. Holden, United Nuclear Corporation
Gordon and Breach, 1967. 244 pp., 6 by 9. Available from American Nuclear Society, $12.50.
LC 66-28066

A discussion designed to cover the entire field of ceramic fuel elements. The presentation, made essentially from a materials viewpoint, covers the preparation, properties, fabrication, and performance of the ceramic fuels. References are given at the end of each chapter.

Ceramic Microstructures: Their Analysis, Significance, and Production

Editors: Richard M. Fulrath and Joseph A. Pask, University of California
John Wiley & Sons, 1968. 1008 pp., 6 by 9. Available from Krieger, $39.50.
LC 68-18484

Proceedings of the Third Berkeley International Materials Conference held at the University of California, June 13–16, 1968, and sponsored by the Lawrence Radiation Laboratory and the U. S. Atomic Energy Commission. This book consolidates scientific and technological information in the field of ceramics, combining the viewpoints of both the producer and the user of ceramic materials. Methods of analysis and production of ceramic microstructures are discussed in detail.

The Compacted States of Vitreous Silica

William Primak, Argonne National Laboratory
Gordon and Breach, 1975. 202 pp., 6 by 9, $24.50.
LC 66-24006 ISBN 0-677-03340-0

A monograph of interest to physicists, chemists, geologists, ceramists, glass technologists, and nuclear engineers. Written at the graduate and postdoctoral levels, this book will be of value to those interested in studying the three-dimensional structure of vitreous silica, a highly variable substance, and in relating its properties and behavior to its structure. Further, the insight into the compacted states of vitreous silica, which is devoid of crystallinity, provides needed background for the study of the behavior and nature of the silicon–oxygen bond without the distractions present in crystalline silicon–oxygen combinations. Volume 4 in the Studies in Radiation Effects in Solids series.

CONTENTS: Prologue. Introduction. The structure of vitreous silica. Pressure compacted vitreous silica. Thermal compaction. Polishing compaction and related phenomena. Shock wave compaction of vitreous silica. Radiation compaction of vitreous silica: neutron compaction, ionization compaction, and ion bombardment. Thermal release of compaction. Ionization release of compaction. The nature of vitreous silica. Appendixes: on the structure of vitreous silica; miscellaneous topics.

Creep-Rupture Data for the Refractory Metals to High Temperatures

J. B. Conway, Mar-Test Inc., and P. N. Flagella, Westinghouse Electric Corp.
Gordon and Breach, 1971. 797 pp., 6 by 9, $79.00.
LC 76-118777 ISBN 0-677-02660

A comprehensive compilation of the available creep-rupture data for the refractory metals of temperatures up to 3000°C. The authors discuss mathematical techniques useful in analyzing creep data, parametric procedures pertinent to measuring stress-rupture data, and procedures for measuring creep-rupture behavior of refractory metals up to high temperatures. Special attention is given to the data accumulated over seven years in the USAEC-sponsored refractory-metal evaluation program conducted at General Electric Company Nuclear Systems Programs.

Deburring: Capabilities and Limitations

L. K. Gillespie, Bendix Corporation, Kansas City Division
Society of Manufacturing Engineers, in press. Estimated date of publication: fall 1977.

A volume describing the capabilities of each of the available deburring processes. Although finding better deburring processes or improvements in existing processes can result in major reductions in deburring costs, four other approaches can be equally effective: analyzing the real product needs, practicing burr prevention, minimizing burrs, and better use of machine operator's time. Since minimizing deburring costs is generally more desirable than just finding another, less expensive process, all these facets of burr-related cost reductions are described.

CONTENTS: Basic approaches to minimizing deburring costs. Product design influences. Burr prevention. Burr formation and properties. Burr minimization. Plant-wide approaches to minimizing deburring costs. An overview of the deburring processes. Vibratory deburring. Spindle finishing. Centrifugal barrel finishing. Abrasive jet deburring. Abrasive flow deburring. Water jet deburring. Brush deburring. Thermal energy method deburring. Electrochemical deburring. Electrochemical loose abrasive deburring. Electropolish deburring. Little known deburring processes. Automation in deburring. Trends in deburring.

Dispersion Fuel Elements

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
Abraham N. Holden, Vallecitos Atomic Laboratory, General Electric Company
Gordon and Breach, 1968. 265 pp., 6 by 9. Available from American Nuclear Society, $11.00.
LC 67-29666

A review of the dispersion fuels for nuclear reactors. This book presents detailed discussions of different types of dispersion fuels and their fabrication processes. A brief history of the use of dispersion fuels and a glossary are included.

Electron Microscopy and Strength of Crystals

Editors: Gareth Thomas and Jack Washburn, University of California
Interscience Publishers, 1963. 1022 pp., 6 by 9. Available from Krieger, $35.00.
LC 62-21631

Proceedings of the First Berkeley International Materials Conference held at the University of California, July 5–8, 1961, sponsored by the Lawrence Radiation Laboratory and the U. S. Atomic Energy Commission.

Engineering Property Data on Selected Ceramics

Volume I: Nitrides

Metals and Ceramics Information Center, Battelle, Columbus Laboratories
Metals and Ceramics Information Center, 1976. 116 pp., 9 by 11. Available from NTIS as MCIC-HB-07(Vol. I). Price schedule on page iii.

A publication providing a convenient source of property data on nitride ceramics for use in engineering. The data are given in the International System of units and in conventional engineering units. Material and testing factors influencing each reported property are specified insofar as possible.

CONTENTS: Introduction and summary. Materials index and property indicator. Nitrides. General characteristics of nitrides. Nitrides of alkaline-earth metals. Aluminum nitride.

Boron nitride. Silicon nitride and silicon nitride base materials. Nitrides of titanium, zirconium, and hafnium. Nitrides of vanadium, niobium, and tantalum. Nitrides of chromium, molybdenum, and tungsten. Nitrides of rare-earth metals. Nitrides of uranium, plutonium, and thorium. References.

Fabrication of Control Rods for Nuclear Reactors

(American Society for Metals—U. S. Atomic Energy Commission Monograph)

William E. Ray, Westinghouse Electric Corp., Cheswick, Pa.

Rowman and Littlefield, 1963. 229 pp., 6 by 9. Available from American Nuclear Society. Library binding, $9.65. Paper binding, $5.35.

LC 62-22278

A monograph written for both nuclear and nonnuclear metallurgical workers. It emphasizes specialized fabricating procedures for commercial power reactors, including a description of the working characteristics of materials used. This book brings together significant findings of transmission electron microscopy concerning dislocation and transformation substructures in materials.

Fabrication of Refractory Metals

(American Society for Metals—U. S. Atomic Energy Commission Monograph)

Walter D. Wilkinson, Argonne National Laboratory

Gordon and Breach, 1970. 429 pp., 6 by 9. Available from American Nuclear Society, $29.50.

LC 70-115054

A companion volume to the ASM–USAEC monograph "Properties of Refractory Metals." This work covers methods of fabricating and processing refractory metals. It deals with specific techniques in fabricating the tantalum-group metals and tungsten-group metals. It also discusses how the refractory metals are reduced from their ores and consolidated into massive bodies.

Fabrication of Thorium Fuel Elements

(American Society for Metals—U. S. Atomic Energy Commission Monograph)

L. R. Weissert, The Babcock & Wilcox Co., and G. Schileo, Comitato Nazionale per l'Energia Nucleare, Rome

American Nuclear Society, 1968. 208 pp., 6 by 9, $11.10.

LC 68-25126

A detailed account of the techniques, experience, and applications associated with fabricating nuclear reactor fuel elements for the thorium cycle.

Fatigue, Tensile, and Relaxation Behavior of Stainless Steels

J. B. Conway, R. H. Stentz, and J. T. Berling, Mar-Test Inc.

U. S. Atomic Energy Commission, 1975. 276 pp., 9 by 11. Available from NTIS as TID-26135. Paper copy, $7.60. Microfiche, $3.00.

LC 74-600115

A detailed treatment of short term tensile, relaxation, and low-cycle fatigue behavior with special emphasis on stainless steels at elevated temperatures. Some new test procedures are highlighted and discussed fairly thoroughly to focus on the types of information that can be obtained. Data generated by use of these procedures are summarized in a fairly comprehensive manner along with similar data reported in other studies. Methods of data analysis are also covered in some depth. Prediction techniques are reviewed, as are considerations of cumulative damage and creep-fatigue interaction.

CONTENTS: Introduction. Low-cycle-fatigue testing. Low-cycle-fatigue data. Estimating low-cycle-fatigue data. Cumulative-damage concepts. Short-term tensile testing. Relaxation behavior. Index.

Fundamental Aspects of Nuclear Reactor Fuel Elements

Donald R. Olander, University of California

Energy Research and Development Administration, 1976. 624 pp., 9 by 11. Available from NTIS as TID-26711-P1. Paper copy, $16.25. Microfiche, $3.00.

Solutions to the problems: available from NTIS as TID-26711-P2. Paper copy, $13.50. Microfiche, $3.00.

LC 76-6485 (CIP) ISBN 0-87079-031-5 (v.1) ISBN 0-87079-031-5 (v.2)

A book designed both for first-year graduate courses (problems included) in nuclear materials and as a reference in the materials design and performance aspects of future fast breeder reactors for electric power production. Recent research is applied to the problem of predicting the performance and longevity of nuclear reactor materials. The book reviews selected aspects of statistical thermodynamics, crystallography, chemical thermodynamics, and physical metallurgy and applies these principles to the problems encountered in nuclear fuel elements.

CONTENTS: Statistical thermodynamics. Thermal properties of solids. Crystal structures. Cohesive energy of solids. Chemical equilibrium. Point defects in solids. Diffusion in solids. Dislocations and grain boundaries. Equation of state of UO_2. Fuel-element thermal performance. Fuel chemistry. Behavior of solid fission products in oxide fuel elements. Swelling due to fission gases. Pore migration and fuel restructuring kinetics. Fission-gas release. Mechanical properties of UO_2. Radiation damage. Irradiation effects in metals: I. Hardening, embrittlement, and fracture. II. Void swelling and irradiation creep. Interaction of sodium and stainless steel. Modeling of the structural behavior of fuel elements and assemblies. Appendix: Elasticity theory. Index.

Fundamentals of Refractory Compounds

Editors: Henry H. Hausner, Polytechnic Institute of Brooklyn,
and Melvin G. Bowman, Los Alamos Scientific Laboratory
Plenum, 1968. 325 pp., 6 by 9, $32.50.
LC 68-13390

A text for metallurgists and chemists and for materials engineers and design engineers concerned with high-temperature programs. This book is based on lectures given during a course at the Extension Division of the University of California at Los Angeles. The main emphasis is on developments in technology and on information concerning the fundamental properties of refractory compounds and the relationship of structure and composition to such properties. An attempt is made to present a systematic foundation of basic information on refractory compounds which can be used to evaluate published data and current technology. The important problems of coating refractory materials and of their use as coatings are discussed with respect to both fundamentals and technology.

Irradiation Effects in Cladding and Structural Materials

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
Spencer H. Bush, Pacific Northwest Laboratory
Rowman and Littlefield, 1965. 225 pp., 6 by 9. Available from University Microfilms as OP64217. Xerographic copy, paper binding, $26.50. Microfilm, $8.90.
LC 65-17838

A presentation of the state of the art in the field of irradiation damage to nuclear materials, restricted to metals used as fuel cladding or as structural components.

Irradiation Effects in Nuclear Fuels

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)
J. A. L. Robertson, Atomic Energy of Canada Ltd.
Gordon and Breach, 1968. 319 pp., 6 by 9. Available from American Nuclear Society, $16.25.
LC 67-26575

An assembly of facts and theories, with interpretations of experimental data, all relating to the irradiation of solid fuels for nuclear reactors. The data gathered for this correlation indicate that relatively few phenomena account for most of the observed behavior of greatly varying types of nuclear fuels. Emphasis is placed on the irradiations of solid fuels that either have some general application or are of help in understanding the phenomena.

Liquid-Metals Handbook

(Second edition)
Editor: R. N. Lyon, Oak Ridge National Laboratory
U. S. Atomic Energy Commission, 1952. 269 pp., 8 by 10. Available from University Microfilms as OP4056. Xerographic copy, paper binding, $31.90. Microfilm, $10.70.

A revised and enlarged edition of the Handbook—one of a series sponsored by the Naval Reactors Branch—intended to stimulate industry to develop and use liquid metals and to stimulate further research on associated problems. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Liquid-Metals Handbook: Sodium–NaK Supplement

Editor: Carey B. Jackson, Mine Safety Appliances Company
U. S. Atomic Energy Commission, 1955. 445 pp., 8 by 10. Available from University Microfilms as OP10842. Xerographic copy, paper binding, $51.70. Microfilm, $17.30.
A presentation of much of the technology of sodium and sodium–potassium systems for heat transfer in reactor engineering. This publication supplements the "Liquid-Metals Handbook."

Magnetism and Metallurgy of Soft Magnetic Materials

Chih-Wen Chen, Iowa State University
Elsevier/North-Holland Publishing Co., in press. Estimated date of publication: winter 1976–1977.
A valuable reference for metallurgists in research and industry and a text for courses at the university level. This book will be part of a series on selected topics in solid-state physics.
CONTENTS: List of most important symbols. Introduction. Ferromagnetism. Magnetization and domain structure. Magnetic properties. Metallurgy of soft magnetic materials. Applications of soft magnetic materials. Special topics: the bubble-domain technique; radiation and environment effects. Appendixes: conversion table of magnetic quantities; values of select physical constants; demagnetizing factors and magnetostatic energy; pair model for magnetocrystalline anisotropy and magnetostriction. References. Author and subject indexes.

Materials for Control Rod Drive Mechanisms

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
George A. Freund, Western Nuclear Corporation
Rowman and Littlefield, 1963. 209 pp., 6 by 9. Available from American Nuclear Society. Library binding, $9.65. Paper binding, $5.35.
LC 63-10997
A discussion of theories basic to the design of control-rod drive mechanisms which relates them to a specific application.

Materials and Fuels for High-Temperature Nuclear Energy Applications

Editors: M. T. Simnad and L. R. Zumwalt, General Dynamics Corporation
MIT Press, 1964. 421 pp., 6 by 9, $17.50.
LC 64-17421 ISBN 0-262-19012-5
Proceedings of the National Topical Meeting of the American Nuclear Society, San Diego, Apr. 11–13, 1962, covering developments in materials and fuels for high-temperature nuclear energy applications, high-temperature being defined as temperatures above those attained in water-cooled reactors. The materials and fuels surveyed included fissionable and fertile refractory oxides and carbides; the solid moderators and reflectors—graphite, zirconium hydride, beryllium, and beryllium oxide; control and poison materials consisting of compounds of boron and of the lanthanides; coolants for high-temperature operations—helium, molten salts, and liquid metals; and such structural materials as refractory metals and pressure-vessel steels. The work encompasses basic experiments to provide fundamental data on the properties and behavior of materials, investigations on fuel elements subjected to simulated operational conditions, and fabrication developments to produce the components in the required forms, shapes, and dimensions.

The Metal Beryllium

Editors: D. W. White, Jr., Knolls Atomic Power Laboratory, and J. E. Burke, Research Laboratory, General Electric Company
American Society for Metals, 1955. 703 pp., 6 by 9. Available from University Microfilms as OP61980. Xerographic copy, paper binding, $81.30. Microfilm, $27.10.
A presentation of basic information on beryllium which covers all aspects of beryllium technology for the use of workers in the field, emphasizing possible uses of the metal in atomic energy work. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Metal Hydrides

Editors and major contributors: William M. Mueller, American Society for Metals; James P. Blackledge, Denver Research Institute, University of Denver; and George G. Libowitz, Ledgemont Laboratory, Kennecott Copper Corporation
Academic Press, 1969. 791 pp., 6 by 9, $39.50.
LC 68-26631 ISBN 0-12-509550-3

A valuable reference for students, research professors, industrial researchers, and any others working in chemical or physical processes involving metal–hydrogen systems. Considerable emphasis is placed on theories of hydride formation as well as on experimental procedures involved in the formation of hydrides, the reactions that occur between hydrides and other media, and the physical and mechanical properties of several classes of hydrides.

The Metal Plutonium

Editors: A. S. Coffinberry and W. N. Miner, Los Alamos Scientific Laboratory
University of Chicago Press, 1961. 446 pp., 6 by 10, $13.50.
LC 61-17072 ISBN 0-226-11179-2

A carefully planned assemblage of papers by plutonium pioneers for the libraries of scientists and engineers interested in the properties and applications of plutonium. A comprehensive background, physical metallurgy and projects at various laboratories, and applications in reactor fuels are covered. The scope is international, the authors being from Canada, France, Great Britain, and the United States. Recognition is given to Russian work to the extent that some published plutonium phase diagrams are reported and discussed. The papers contained in this book were given at the USAEC–ASM World Metallurgical Congress in Chicago. Prepared with the cooperation of the American Society for Metals.

The Metallurgy of Hafnium

Editors: D. E. Thomas, Bettis Plant, Westinghouse Electric Corp., and E. T. Hayes, Bureau of Mines, U. S. Department of the Interior
U. S. Atomic Energy Commission, 1960. 384 pp., 6 by 9. Available from University Microfilms as OP53222. Xerographic copy, paper binding, $45.40. Microfilm, $15.20.

A reference work dealing with the science and technology of the extraction, fabrication, properties, and use of the metal hafnium. Individual chapters present information generally unavailable previously. The book follows the natural sequence of functions involved in processing the ore through to a finished product. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Metallurgy of Uranium and Its Alloys

(National Nuclear Energy Series, Division IV, Volume 12A)
Editor: J. C. Warner, Carnegie Institute of Technology. Associate Editors: John Chipman, Department of Metallurgy, Massachusetts Institute of Technology, and Frank H. Spedding, Institute for Atomic Research, Iowa State College
U. S. Atomic Energy Commission, 1953. 208 pp., 6 by 9. Available from NTIS as NNES-IV-12A: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A record of the most significant part of the work on the metallurgy of uranium and its alloys which was carried out during World War II in the various laboratories of the Manhattan Project. Although much research in this field has continued since the war, this account serves to emphasize how little was known about the metallurgy of this element before the war and how rapidly knowledge can be accumulated by American scientists and engineers in times of emergency.

The Metallurgy of Zirconium

(National Nuclear Energy Series, Division VII, Volume 4)
Editors: Benjamin Lustman, Westinghouse Electric Corp., and Frank Kerze, Jr., U. S. Atomic Energy Commission
McGraw-Hill, 1955. 776 pp., 6 by 9. Available from University Microfilms as OP16857: Xerographic copy, paper binding, $90.60. Microfilm (35 mm), $30.20. Also available from Microforms International: Microfilm (16 mm), $17.00.

A critical presentation of many aspects of zirconium technology. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Neutron Absorber Materials for Reactor Control

W. K. Anderson, Knolls Atomic Power Laboratory, and J. S. Theilacker, Bettis Atomic Power Laboratory, with contributions from other authorities
U. S. Atomic Energy Commission, 1962. 862 pp., 6 by 9. Available from University Microfilms as OP64368. Xerographic copy, paper binding, $100.40. Microfilm, $33.50.

A well-illustrated book that reviews available information on materials being used or having potential use in the control of nuclear reactors. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Nuclear Graphite

Editor: R. E. Nightingale, Hanford Atomic Products Operation
Academic Press, 1962. 547 pp., 6 by 10. Available from University Microfilms as PB2182. Xerographic copy, paper binding, $64.50. Microfilm, $21.50.
LC 62-21148

A book that brings together the physical, mechanical, thermal, and manufacturing properties of nuclear-grade graphite and the relation of radiation effects of each property. Nuclear graphite is used chiefly as moderator and reflector materials. In addition, this book discusses briefly the use of graphite with uranium as a nuclear fuel.

Nuclear Reactor Fuel Elements, Metallurgy and Fabrication

Editor: Albert R. Kaufmann, Nuclear Metals, Inc.
Interscience Publishers, 1962. 739 pp., 7 by 10. Available from University Microfilms as PB2180. Xerographic copy, paper binding, $85.70. Microfilm, $28.60.
LC 61-14099

An indispensable volume for metallurgists and fabrication specialists interested in the production of nuclear reactor fuel elements. Reactor engineers can obtain from it much useful information for conceptual design purposes.

Nuclear Reactor Metallurgy

W. D. Wilkinson, W. F. Murphy, and W. J. McGonnagle, Argonne National Laboratory
D. Van Nostrand Co., 1958. 382 pp., 6 by 9. Available from University Microfilms as OP57720. Xerographic copy, paper binding, $44.70. Microfilm, $14.90.
LC 58-13354

A presentation of course material in applied reactor metallurgy developed at the International School of Nuclear Science and Engineering, Argonne National Laboratory.

Physical Metallurgy of Uranium

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)

A. N. Holden, Vallecitos Atomic Laboratory, General Electric Company
Addison-Wesley, 1958. 262 pp., 6 by 9. Available from University Microfilms as OP17581. Xerographic copy, paper binding, $31.40. Microfilm, $10.50.
LC 58-12569

A comprehensive and unified treatment of the physical metallurgy of uranium in which the author summarizes, correlates, and critically evaluates the wealth of information available in the field. Although important experimental techniques and results are thoroughly described, emphasis is placed on interpretation in terms of fundamental properties and mechanisms.

Physical Metallurgy of Uranium Alloys

Editors: John J. Burke, David A. Colling, Alvin E. Gorum, and Jacob Greenspan, Army Materials and Mechanics Research Center
Brook Hill Publishing Co., 1976. 1022 pp., 6 by 9, $45.00.
LC 76-16691

Proceedings of the Third Army Materials Technology Conference, held at Vail, Colo., Feb. 12–14, 1974, sponsored by the Army Materials and Mechanics Research Center and the U. S. Atomic Energy Commission. New areas of application for depleted uranium alloys were investigated. Uranium in its depleted form is useful for nonnuclear applications by virtue of its high density and the structural properties that are attainable. The advances made in the physical metallurgy of uranium and its alloys are highlighted. Special emphasis

is placed on relevant developments within the last 10 years pertaining to the physical metallurgy, processing, and properties of the more outstanding alloys that appear applicable to high-density structural uses.
CONTENTS: Five main subject areas: Preparation and fabrication (4 papers). Structure and transformation (3 papers). Deformation and fracture (3 papers). Mechanical behavior (9 papers). Corrosion and its control (7 papers). Index.

Plutonium Handbook: A Guide to the Technology

(In two volumes)
Editor: O. J. Wick, Pacific Northwest Laboratory
Gordon and Breach, 1967. 985 pp., 9 by 11. Available from American Nuclear Society, $48.25 per set of two volumes.
LC 65-27512
A comprehensive descriptive report of the physics, chemistry, chemical processing, metallurgy, fabrication, utilization, analysis, and hygienic aspects of plutonium and its alloys, with emphasis on the technology of producing and using these materials.

Properties of Refractory Metals

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
Walter D. Wilkinson, Argonne National Laboratory
Gordon and Breach, 1969. 355 pp., 6 by 9. Available from American Nuclear Society, $27.50.
LC 72-75349
An in-depth treatment of the properties of refractory metals and their alloys with particular reference to fabrication practices and the use of these materials in nuclear reactors. The book correlates processing and alloying behavior, basic atomic structure, and physical metallurgy and presents typical values of the properties of refractory metals to familiarize readers with their mechanical and thermal behavior under different conditions.

Quality Control in Fabrication of Nuclear Pressure Vessels

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
R. D. Wylie and W. J. McGonnagle, Southwest Research Institute
Rowman and Littlefield, 1965. 190 pp., 6 by 9. Available from American Nuclear Society, $5.50.
LC 65-13261
A discussion of the ramifications of quality control in the design and fabrication of pressure vessels for nuclear applications.

Radiation Effects on Toughness of Ferritic Steels for Reactor Vessels

(American Society for Metals–U. S. Atomic Energy Commission Monograph)
L. P. Trudeau, The International Nickel Company of Canada, Ltd.
Rowman and Littlefield, 1964. 179 pp., 6 by 9. Available from American Nuclear Society. Library binding, $9.65. Paper binding, $5.35.
LC 64-22895
A discussion of how irradiation affects the toughness of ferritic steels. Approaches for assessing the reduction of strength caused by notch effects and the mechanism of irradiation embrittlement are emphasized. A theory of notch sensitivity that correlates the metallurgical and mechanical aspects of toughness is suggested.

Radiation-Induced Voids in Metals

(AEC Symposium Series)
Editors: James W. Corbett, State University of New York at Albany,
and Louis C. Ianniello, U. S. Atomic Energy Commission
U. S. Atomic Energy Commission, 1972. 884 pp., 6 by 9. Available from NTIS as CONF-710601. Paper copy, $9.00. Microfiche, $3.00.
LC 72-600048
Proceedings of an international conference held at Albany, N. Y., June 9–11, 1971. This book gives a broad, balanced perspective of all the facets that might be relevant to the solution of the void-formation problem. It summarizes the remarkable progress achieved in just a few years on the problems of voids and swelling in metals subjected to

high-temperature irradiation. This swelling implies an additional cost of several billion dollars in the cost of fast breeder reactors planned for the United States alone by the year 2000.

CONTENTS: Papers in the areas of research on engineering materials and pure metals irradiated with neutrons; accelerator studies, including high-voltage electron microscopy and high-energy heavy-ion accelerators; quenching experiments and other peripheral, but related, kinetic studies; techniques and theory; the void lattice; and computer-simulation studies (40 papers). Name and subject indexes.

Rare Earth Alloys

Karl A. Gschneidner, Jr., Los Alamos Scientific Laboratory
D. Van Nostrand Co., 1961. 449 pp., 6 by 9. Available from University Microfilms as OP33978. Xerographic copy, paper binding, $52.80. Microfilm, $17.60.

A review of the known rare-earth alloy systems undertaken in response to the rapidly increasing commercial and technological importance of these metals and their alloys. This volume should benefit the scientist who is primarily engaged in research in the field of metals. However, it will also be of interest to reactor engineers and physicists seeking information in this area. Translated into Russian.

The Rare Earths

Editors: F. H. Spedding and A. H. Daane, Iowa State University
John Wiley & Sons, 1961. 641 pp., 6 by 10. Available from Krieger, $18.50.
LC 61-15413

A book containing papers from the symposium on rare earths held in Chicago, Ill., November 1959. The increasing interest in rare earths and their potential for expanded contributions to science and technology prompted the American Society for Metals and the U. S. Atomic Energy Commission to sponsor this symposium. A number of companies are now producing rare earths commercially and, as described in this book, many rare earths have actual or potential applications in industry. Translated into Russian.

The Refractory Carbides

Edmund K. Storms, Los Alamos Scientific Laboratory
Academic Press, 1967. 285 pp., 6 by 9, $26.50.
LC 66-30199 ISBN 0-12-672850-X

A basic guide to the chemist who undertakes the fundamental study of refractory carbides. Each system is discussed in terms of phase relation, lattice parameter and structure, chemical reactivity, and thermodynamic and vaporization behavior.

Sodium—NaK Engineering Handbook

(In five volumes)

Editor: O. J. Foust, Liquid Metals Engineering Center, Atomics International, Division of North American Aviation, Inc.
Gordon and Breach. All volumes 8 by 11.
LC 70-129473 ISBN 0-677-03070

Volume I: Sodium Chemistry and Physical Properties
1972. 327 pp., $36.00.
ISBN 0-677-03020

Volume II: Sodium Flow, Heat Transfer, Intermediate Heat Exchangers, and Steam Generators
1976. 381 pp., $39.00.
ISBN 0-677-03030

Volume III: Sodium Systems, Safety, Handling, and Instrumentation
In press. 320 pp.
ISBN 0-677-03040

Volume IV: Sodium Pumps, Valves, Piping, and Auxiliary Equipment
In press. 273 pp.
ISBN 0-677-03050

Volume V: Sodium Purification, Material, Heaters, Coolers, and Radiators
In press. 316 pp.
ISBN 0-677-03060

A handbook intended for use by present and future designers in the Liquid Metal Fast Breeder Reactor (LMFBR) Program and by the engineering and scientific community performing other types of investigation requiring high-temperature sodium and NaK technology. The arrangement of subject matter progresses from a technological discussion of sodium and NaK to discussions of various categories and uses of hardware in sodium and NaK systems. Emphasis is placed on sodium and NaK as heat-transport media. Fifty authors helped in writing this book; several thousand documents were reviewed in accumulating and compiling information. Sufficient data are included for basic understanding of sodium and NaK technology. The information presented is adequate for use in feasibility studies and conceptual design, sizing components and systems, developing preliminary component and system descriptions, identifying technological limitations and problem areas, and defining basic constraints and parameters.

CONTENTS:

Volume I. Physical properties. Chemistry. Index.

Volume II. Fluid mechanics of liquid metals. Liquid-metal heat transfer. Intermediate heat exchangers. Steam generators. Index.

Volume III. Sodium and NaK Systems. Safety. Handling. Instruments. Index.

Volume IV. Pumps. Bearings and seals. Valves. Vessels and piping. Auxiliary equipment and system accessories. Index.

Volume V. Purification. Effects on materials. Heaters and coolers. Radiators, condensers, and boilers. Applications. Index.

Stress-Rupture Parameters: Origin, Calculation, and Use

J. B. Conway, General Electric Company

Gordon and Breach, 1969. 308 pp., 6 by 9, $39.00.

LC 68-8276 ISBN 0-677-01860

A textbook on the development of stress-rupture parameters and their evaluation and use. The more commonly employed parameters are treated in considerable depth, and some others whose usefulness has not yet been completely established are considered. The author outlines the mathematical approach to the calculation of parameter constants and the establishment of parameter plots and devotes a section to discussing the fundamental considerations of least squares as applied to the analysis of stress-rupture data. Both linear and nonlinear regression analyses are described, and a special type of graph paper is introduced for the parameter plots. The author attempts to provide a logical development of the subject so that new students can develop a fairly comprehensive understanding in this area.

Thorium Fuel Cycle

(AEC Symposium Series)

Coordinator: Ray G. Wymer, Oak Ridge National Laboratory

U. S. Atomic Energy Commission, 1968. 847 pp., 6 by 9. Available from NTIS as CONF-660524. Paper copy, $6.00. Microfiche, $3.00.

LC 67-62083

Proceedings of the Second International Thorium Fuel Cycle Symposium, May 2–6, 1966, sponsored by the Oak Ridge National Laboratory and the U. S. Atomic Energy Commission. The symposium was designed to take a fresh look at the reasons for working on the thorium fuel cycle and at its long-range prospects. The international flavor and the nature of the papers attest to the widespread interest and confidence in the thorium fuel cycle to produce economically competitive power.

Thorium: Preparation and Properties

J. F. Smith, O. N. Carlson, D. T. Peterson, and T. E. Scott,

Ames Laboratory and Department of Metallurgy, Iowa State University

Iowa State University Press, 1975. 385 pp., 6 by 9, $9.95.

LC 74-23478 (CIP) ISBN 0-8138-1635-1

A digest to provide ready access to data on thorium. The appreciable amount of thorium information that has become available since 1958 is spread through a wide variety of reports, journals, and conference proceedings and consequently is accessible only with difficulty. This book tries to coalesce this scattered information into a convenient and easily accessible package. The compilation is critical in the sense that divergent results are weighed on the basis of the preponderance of evidence and of consistency with other data. Where evidence is inconclusive, the available information is presented. "Thorium: Preparation and

Properties" adds to the fund of thorium data already presented in "The Metal Thorium," published in 1958 by the American Society for Metals.
CONTENTS: Preparation of thorium metal. Purification of thorium metal. Annealing, mechanical forming and other fabrication processes. Mechanical properties of thorium and its alloys. Diffusion in thorium. Physical properties. Alloying behavior. Index.

Thorium Production Technology

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)
F. L. Cuthbert, National Lead Company of Ohio
Addison-Wesley, 1958. 303 pp., 6 by 9. Available from University Microfilms as OP17584. Xerographic copy, paper binding, $36.30. Microfilm, $12.10.
LC 58-12570
A book that contains practically all the information available on thorium-production technology at the time of the conference.

Uranium Dioxide: Properties and Nuclear Applications

Editor: J. Belle, Bettis Plant, Westinghouse Electric Corp., with contributions from other authorities
U. S. Atomic Energy Commission, 1961. 726 pp., 6 by 9. Available from University Microfilms as OP16927. Xerographic copy, paper binding, $85.20. Microfilm, $28.40.
A handbook presenting information acquired from the development of uranium dioxide as a reactor fuel and from the use of dioxide fuel elements. Includes experience of Bettis Plant and its suppliers in obtaining, fabricating, and testing the material. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Uranium Metallurgy

(In two volumes)
W. D. Wilkinson, Argonne National Laboratory
Interscience Publishers, 1962. Both volumes 6 by 9.
LC 62-1451
Volume I: Uranium Process Metallurgy
755 pp. Available from University Microfilms as OP45282.
Xerographic copy, paper binding, $88.30. Microfilm, $29.50.
A comprehensive review of uranium process metallurgy. Information pertinent to the metallurgical processing of uranium ores and metal and to safe practice in uranium metallurgy is given. Some aspects of processing uranium alloys are included.
Volume II: Uranium Corrosion and Alloys
743 pp. Available from University Microfilms as OP45282.
Xerographic copy, paper binding, $85.20. Microfilm, $28.40.
An assembly of most of the important information on uranium corrosion and uranium alloys of significance to metallurgists.

Uranium Production Technology

Editors: C. D. Harrington and A. E. Ruehle, Mallinckrodt Chemical Works, with contributions from other authorities
D. Van Nostrand Co., 1959. 550 pp., 6 by 9. Available from Krieger, $21.00.
LC 59-13493
A presentation of technology in the United States of uranium-metal production from uranium concentrates or high-grade uranium ore. Limited amounts of history, pertinent production details, and development work are included. This comprehensive book, the first in its field, includes work done at many USAEC installations throughout the United States. It is written for the student of metallurgy both in an academic institution and in industry.

Uranium Technology

(National Nuclear Energy Series, Division VII, Volume 2A)
J. E. Vance, consultant, New York Operations Office, and J. C. Warner, consultant, Argonne National Laboratory
U. S. Atomic Energy Commission, 1951. 231 pp., 6 by 9. Available from NTIS as TID-5231; Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A review of the technological development that resulted in the production of uranium as a commercial commodity in accordance with rigid specifications of chemical purity and physical form.

Welding and Brazing Techniques for Nuclear Reactor Components

(American Society for Metals–U. S. Atomic Energy Commission Monograph)

Gerald M. Slaughter, Oak Ridge National Laboratory

Rowman and Littlefield, 1964. 194 pp., 6 by 9. Available from American Nuclear Society. Library binding, $9.65. Paper binding, $5.35.

LC 64-16362

A description of welding and brazing techniques for nuclear reactor components, including fuel elements, pressure and containment vessels, heat exchangers, and piping. The book concludes with a discussion of methods for repairing equipment, including remote joining and cutting techniques.

RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Austenitic Stainless Steel Weld Materials, A Data Compilation and Review
Hanford Engineering Development Laboratory. May 1974. 118 pp. Available from NTIS as HEDL-TME-74-25.

Fracture of Uranium Alloys
Sandia Laboratories. March 1974. 68 pp. Available from NTIS as SLL-74-5212.

Liquid Metal Surface Tensions of Groups III-A, IV-A, and V-A Metals, Annotated Bibliography for
Ames Laboratory. April 1976. 61 pp. Available from NTIS as IS-3829.

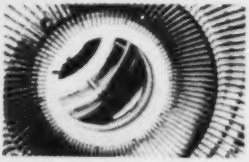
Lithium Iron-Base Alloy Corrosion Studies, Review of
Oak Ridge National Laboratory. January 1976. 33 pp. Available from NTIS as ORNL/TM-4927.

Materials Sciences Programs, FY 1975
Energy Research and Development Administration, Washington, D. C. July 1975. 151 pp. Available from NTIS as ERDA-55.

Nuclear Raw Materials, A Selected Bibliography
ERDA Technical Information Center. November 1975. 43 pp. Available from NTIS as TID-3357.

Recent Studies of Point Defects in Metals: Selected Topics
Brookhaven National Laboratory. 1974. 154 pp. Available from NTIS as BNL-19243.

Sodium Technology, July 1973–December 1974
ERDA Technical Information Center. August 1975. 119 pp. Available from NTIS as TID-3334-S2.
(Bibliographies on this subject for previous years are also available.)



PHYSICS

The Adiabatic Motion of Charged Particles

Theodore G. Northrop, Lawrence Radiation Laboratory
Interscience Publishers, 1963. 109 pp., 8 by 6. Available from University Microfilms as PB2123. Xerographic copy, paper binding, $14.10. Microfilm, $6.00.

A book that presents methods of determining charged-particle trajectories by the theory of the guiding center motion and the adiabatic invariants. Adiabatic approximation is of utmost importance, especially to the study of plasma physics and particle motion in space and in the terrestrial (Van Allen) radiation belts.

The Characteristics of Electrical Discharges in Magnetic Fields

(National Nuclear Energy Series, Division I, Volume 5)
Editors: A. Guthrie and R. K. Wakerling, Radiation Laboratory, University of California
McGraw-Hill, 1949. 376 pp., 6 by 9. Available from University Microfilms as OP 13366: Xerographic copy, paper binding, $45.30. Microfilm (35 mm), $15.10.
Also available from Microforms International: Microfilm (16 mm), $13.50.

A presentation of the results of studies at the Radiation Laboratory, University of California, on the characteristics of electrical discharges in magnetic fields, particularly discharges in the vapors of uranium compounds.

Computing Methods in Reactor Physics

Editors: H. Greenspan, C. N. Kelber, and D. Okrent, Argonne National Laboratory
Gordon and Breach, 1968. 589 pp., 6 by 9, $60.00.
LC 68-28232 ISBN 0-677-11890

A deep, broad foundation for working with numerical analysis and computation in the field of reactor physics. Programming per se has not been emphasized; rather, the problems of reactor physics are treated in detail so that the reader will appreciate the solution of the problems. One chapter is devoted to the development of a fundamental mathematical model of neutron transport.

Controlled Thermonuclear Reactions (An Introduction to Theory and Experiment)

Samuel Glasstone, consultant to the U. S. Atomic Energy Commission,
and R. H. Lovberg, Los Alamos Scientific Laboratory
D. Van Nostrand Co., 1960. 530 pp., 6 by 9. Available from Krieger, $20.95.

A book written primarily to provide the necessary background for physicists and engineers planning to enter the field of research in controlled thermonuclear reactions. Treatment of subject is directed largely to experimentalists. However, sufficient theory is introduced to enable the reader to appreciate the principles underlying the observed phenomena. Translated into German.

Determination of the Isotopic Composition of Uranium

(National Nuclear Energy Series, Division I, Volume 13)
A. E. Cameron, K-25 Laboratories, Union Carbide and Carbon Corporation
U. S. Atomic Energy Commission, 1950. 173 pp., 6 by 9. Available from NTIS as TID-5213: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A description of the use of mass spectrometry and counting to determine the isotopic composition of uranium ranging from highly impoverished material to material highly enriched in the ^{235}U isotope.

Electric Probes in Stationary and Flowing Plasmas: Theory and Application

Paul M. Chung, Lawrence Talbot, and Kenell J. Touryan
Springer-Verlag, 1975. 150 pp., 6 by 9, $19.80.
LC 74-8844 ISBN 0-387-06800-7

A comprehensive account of the latest information available on electric probes, particularly in the areas of transitional and continuum flow phenomena. The book offers, in addition, a critical appraisal of the more significant probe theories and experimental investigation for all aspects of probe application. The volume is intended for the engineer or scientist who desires a complete survey of probe theories and wishes to apply the available information to specific diagnostic situations encountered in the laboratory or in flight environments. Volume 11 in the Applied Physics and Engineering series.
CONTENTS: Nomenclature. Fundamental considerations. Collisionless and transitional electric probes. Continuum electric probes. Special topics. Appendix. Index.

Elementary Plasma Physics

Conrad L. Longmire, Los Alamos Scientific Laboratory
Interscience Publishers, 1963. 296 pp., 6 by 9, $15.50.
LC 63-18563 ISBN 0-470-54447-3

A book based on lecture notes of the author. The lectures were presented to an audience of theoretical and experimental physicists working in the program for the development of thermonuclear reactors. Plasma physics was presented as a connected subject. Most of the useful ideas were produced by the interaction of many minds. The general level of the book is such that an intermediate physics graduate student should have no trouble with it.

The Elements of Neutron Interaction Theory

Anthony Foderaro, The Pennsylvania State University
MIT Press, 1971. 594 pp., 6 by 9, $23.95.
LC 79-103896 ISBN 0-262-06033-7

An introductory text on the classical, quantum mechanical, and nuclear theories underlying the principles employed to solve problems in the interaction of radiation with matter. The book can be used to prepare the first-year nuclear engineering graduate student for courses in practical applications, such as reactor core design, shielding, and radiation effects. It is also intended for engineers and scientists seeking to understand the theoretical basis for radiation shielding design, reactor core design, and radiation damage in materials for general nuclear applications and space vehicles. An understanding of the interaction process, including energetics and cross sections, is fundamental to further study or work in nuclear physics and engineering.

Excitation in Heavy Particle Collisions

E. W. Thomas, Georgia Institute of Technology
John Wiley & Sons, 1972. 450 pp., 7 by 10, $27.75.
LC 79-37939 ISBN 0-471-85890-0

A compilation of published data on the formation of excited atoms induced in collisions between atomic and molecular systems. Criteria are established against which experimental data can be examined to determine the validity and accuracy of such data. A volume in the Wiley-Interscience Atomic and Molecular Collisional Processes series.

CONTENTS: Introduction. Relationship between cross section and experimental parameters. Determination of experimental parameters. Summary and critique of the experimental data. Experiments involving atomic hydrogen targets: target excitation and charge transfer excitation of projectiles. Excitation of a helium target. Excitation of heavy monoatomic gases. Excitation of molecular targets. Formation of excited atomic hydrogen projectiles. Excitation of helium and other heavy projectiles. Bibliography. Appendixes: recent additional material, formation of fast excited H and He atoms under multiple collision conditions. Author and subject indexes.

Fast Reactor Cross Sections: A Study Leading to a 16 Group Set

S. Yiftah, Israel Atomic Energy Commission, and D. Okrent and P. A. Moldauer, Argonne National Laboratory
Pergamon Press, 1960. 130 pp., 6 by 9. Available at Microforms International.
Copyflo, soft binding, $15.00 (add $6.00 for hard cover). Microfiche (105 x 148 mm), $12.60. Microfilm (negative or positive film, open reel, 16 or 35 mm), $8.40. Microfilm in 3M or Kodak cartridge (16 mm), $11.40.
LC 60-53375 ISBN 0-08-009396-5

A study to construct a new multigroup cross section set in which an effort has been made to explain and document all choices and assumptions made. The constants were arrived at by a review of the available experimental data and by theoretical estimates when such data were not available. Gaps, conflicts, and inconsistencies in the data are pointed out. The results of critical experiments were not used in assigning values to microscopic parameters or in choosing within experimental uncertainty, therefore the comparison of the predictions of calculation with the results of such experiments in the final section provides some evaluation of the agreement or lack of agreement between microscopic and integral experiments in fast reactor physics. Volume 4 of the International Series of Monographs on Nuclear Energy, Division II: Nuclear Physics.

The Foundations of Neutron Transport Theory

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)
Richard K. Osborn, University of Michigan, and Sidney Yip, Massachusetts Institute of Technology
Gordon and Breach, 1967. 126 pp., 6 by 9, $14.50.
LC 66-24007 ISBN 0-677-01170

An examination of the origins of the neutron transport equation in an effort to provide a more logical foundation of neutron transport theory. Although the book consists mainly in putting known results into new perspective, the approach used brings many aspects of the neutron problem into contact with other microscopic transport theories, and a generalization to the study of higher order densities is presented under special topics.

Fusion Energy Conversion

(American Nuclear Society–Energy Research and Development Administration Monograph)
George H. Miley, University of Illinois
American Nuclear Society, 1976. 468 pp., 6 by 9, $39.80.
LC 75-44554

A detailed examination of energy conversion. The first two chapters review some basic aspects of fusion and plasma energy balances and stress the relation among the selection of the fusion fuel, the type of reactor, and the energy conversion system. Three distinct approaches to fusion energy conversion are included: direct conversion (direct collection of charged particles and electromagnetic field coupling), thermal conversion, and nonelectrical conversion. The author also describes fusion energy complexes that use the output directly

to supply the needs of associated agricultural and manufacturing facilities as well as to produce portable synthetic fuels.

CONTENTS: Introduction. Fuel cycles and energy balance. Direct collection. Electromagnetic coupling. Thermal conversion. Nonelectrical conversion. Appendixes: evaluation of $n\tau$ for various reactors; fusion fuel reserves; evaluation of radiation and fusion powers; requirements for $n\tau$; auxiliary losses, surface effects, and voltage holding in direct collectors; energy recovery in neutral beam systems; compression–expansion relations; efficiencies for the type-S and type-P cycles; ATC scaling and clamped burn efficiency; idealized analysis of bootstrap coupling. Index.

Gamma-Ray Spectrum Catalogue

(In two volumes)

R. L. Heath, National Reactor Testing Station

Volume 1: Scintillation Spectrometry Gamma-Ray Spectrum Catalogue
(Second Edition)

Phillips Petroleum Company, 1964. 365 pp., 9 by 11. Available from NTIS as IDO-16880-1. Paper copy, $10.00. Microfiche, $3.00.

A description of gamma-ray spectrometry using NaI scintillation detectors. The presentation includes a discussion of the factors that influence detector response, the experimental techniques used in the compilation of gamma-ray spectra for the catalogue, and recently developed computer techniques for analysis of gamma-ray spectra. The second edition is a complete revision of the original data compilation, which was issued as IDO-16408 in 1958.

CONTENTS: Introduction. Detector response. Effects due to reactor environment. Summation effects. Bremsstrahlung. Quantitative analysis of scintillation gamma-ray spectra. Experimental measurements. Computer techniques for data analysis. Appendixes: index of gamma rays ordered by Z, A, photon energy, method of production, and half-life; intrinsic efficiencies for NaI detectors; photopeak efficiency and other data for analysis of gamma-ray spectra; numerical data used in compilation of gamma-ray spectra.

Volume 2: Gamma-Ray Spectrum Catalogue: Ge(Li) and Si(Li) Spectrometry
(Third edition)

Aerojet Nuclear Company, 1974. 631 pp., 11 by 16. Available from NTIS as ANCR-1000-2. Paper copy, $25.00. Microfiche, $3.00.

A collection of experimental spectra for over 300 nuclides obtained with state-of-the-art gamma-ray spectrometers, principally with Ge(Li) spectrometers. The data presented for each nuclide include tabulated experimental values for gamma-ray energies and intensities with associated experimental error. A number of specialized experimental spectra are given, including gamma-ray spectra of gross fission products, rare gases and their daughter nuclides associated with fission, and the natural radioactive decay chains.

The first volume of the third edition, still in preparation, will describe important experimental considerations in the use of Ge(Li) and Si(Li) spectrometers to measure gamma-ray spectra, including experimental techniques and a discussion of factors influencing detector response.

CONTENTS: Introduction. Experimental measurements (includes tables giving the characteristics of detectors used for catalogue data and the gamma rays used as reference standards for energy measurement). Source production (includes a table giving the facilities used to produce isotopic samples). Master index of spectra. Experimental gamma-ray spectra.

Hyperfine Structure and Nuclear Radiations

Editors: E. Matthias and D. A. Shirley, University of California

North-Holland Publishing Co., 1968. 1100 pp., 6 by 9, $53.95.

A collection of papers presented at a conference held at Asilomar Conference Grounds, Pacific Grove, Calif., Aug. 25–30, 1967, and sponsored by the National Science Foundation, American Physical Society, University of California, and U. S. Atomic Energy Commission. Available in German.

Introduction to the Theory of Neutron Diffusion

(Volume I)

K. M. Case, University of Michigan, F. de Hoffmann, Los Alamos Scientific Laboratory, and G. Placzek, Institute for Advanced Study

U. S. Atomic Energy Commission, 1953. 174 pp., 8 by 11. Available from University Microfilms as OP25618 VI. Xerographic copy, paper binding, $20.90. Microfilm, $7.00.

A detailed discussion of the general equations of one-velocity neutron-diffusion theory and of their solution for the special case of a homogeneous infinite medium with isotropic scattering.

Ion Implantation Range and Energy Deposition Distributions

Volume 1: High Incident Ion Energies

David K. Brice, Sandia Laboratories

Plenum, 1975. 590 pp., 9 by 11, $59.50.

LC-74-34119 (CIP) ISBN 0-306-67401-7

A work motivated by the widespread and varied uses to which ion implantation techniques are being applied and by a need for standard tabulations of certain physical properties associated with the process. Among these quantities are the partitioning of the ion energy into damage and other processes, the spatial distribution within the target material of the energy in each of these categories, and the distribution of the implanted ions themselves. This book is intended to provide such information for a variety of incident ions and elemental target materials. The information is presented in a form allowing easy interpolation to other ion–target combinations and to energies other than those specifically considered.

CONTENTS: General description of ion implantation processes. Ion range distributions. Damage energy distributions. Ionization distributions. Silicon. References.

Magnets and Magnetic Measuring Techniques

(National Nuclear Energy Series, Division 1, Volume 2)

Editors: R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory

U. S. Atomic Energy Commission, 1949. 213 pp., 6 by 9. Available from University Microfilms as OP6232: Xerographic copy, paper binding, $25.70. Microfilm (35 mm), $8.60. Also available from Microforms International: Microfilm (16 mm), $10.00.

A discussion of the theory and design of magnets with particular reference to the design of calutron magnets.

A Manual of Experiments in Reactor Physics

Contributing Editor: Frank A. Valente, Rensselaer Polytechnic Institute

Macmillan Co., 1963. 335 pp., 6 by 9. Available from University Microfilms as OP53919. Xerographic copy, paper binding, $40.10. Microfilm, $13.40.

LC 63-14341

A laboratory manual describing the laboratory procedure used at Rensselaer Polytechnic Institute and detailing 23 subcritical reactor experiments involving the theory and practice of reactor physics. Part I summarizes the essential at-hand information appropriate to the experiments discussed and described in the manual; Part II presents the 23 experiments, which are divided into three groups: (1) experiments requiring only steady sources of neutrons, (2) experiments requiring a subcritical assembly and a steady source of neutrons, and (3) experiments requiring a sigma pile or a subcritical assembly and a pulsed source of neutrons. The text is well illustrated and contains tabulations of experimental data and a number of classical equations and their solutions.

Microwave Semiconductor Devices: Fundamentals and Radiation Effects

R. J. Chaffin, Sandia Laboratories

John Wiley & Sons, 1973. 387 pp., 6 by 9, $26.25.

LC 73-7581 (CIP) ISBN 0-471-14311-1

A book designed to provide electronic circuit designers and system planners with the understanding needed to design radiation-tolerant microwave semiconductor systems. The physics of device and circuit operation are discussed in moderate detail, and the macroscopic semiconductor material parameters (conductivity, mobility, etc.) critical to device operation are identified. Experimental measurements are described as well as theoretical predictions of radiation damage. This presentation is of primary value to electrical and electronics engineers, device physicists, nuclear engineers, and military systems planners; it can also serve as a text at the graduate level.

CONTENTS: Introduction. Characteristic properties of bulk semiconductors. p–n junction diodes and transistors. Device fabrication and parameter measurement techniques. Basic radiation damage to semiconductors. Schottky-barrier diode mixers and detectors. Radia-

tion damage in *p-i-n* switches and limiters. Radiation damage in IMPATT and TRAPATT devices. Radiation damage in Gunn and LSA devices. Radiation damage in BARITT devices. Radiation damage in step-recovery diode frequency multipliers. Radiation damage in microwave transistors. Radiation damage in tunnel diode devices. Appendixes: physical constants of semiconductors; microwave circuit boards and cavities; spectrum dependence of neutron damage. List of symbols. Index.

Miscellaneous Physical and Chemical Techniques of the Los Alamos Project: Experimental Techniques

(National Nuclear Energy Series, Division V, Volume 3)

Editors: Alvin C. Graves and Darol K. Froman, Los Alamos Scientific Laboratory

McGraw-Hill, 1952. 323 pp., 6 by 9. Available from University Microfilms as OP6226: Xerographic copy, paper binding, $38.50. Microfilm (35 mm), $12.90. Also available from Microforms International: Microfilm (16 mm), $11.50.

A record of developments resulting from experimental work at Los Alamos Scientific Laboratory during World War II.

Monte Carlo Principles and Neutron Transport Problems

Jerome Spanier and Ely M. Gelbard, Westinghouse Electric Corp.

Addison-Wesley, 1969. 234 pp., 6 by 9, $17.50.
LC 69-17067

An introduction to the Monte Carlo methods, focusing on the methods of superposition and reciprocity, their application, practicality, and capabilities. A volume in the Addison-Wesley Computer Science and Information Processing series.

Naval Reactors Physics Handbook

Volume I: Selected Basic Techniques

Editor: A. Radkowsky, Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission

U. S. Atomic Energy Commission, 1964. 1545 pp., 6 by 9. Available from University Microfilms as OP55514 VI. Xerographic copy, paper binding, $179.00. Microfilm, $59.70.
LC 65-60008

A handbook that presents the most pertinent parts of the physics knowledge gained in the Naval and Shippingport (PWR) reactor programs. It is written for those interested in nuclear core design and brings together basic theoretical and experimental material of especially wide interest, including that common to both thermal- and intermediate-neutron-energy reactor types.

Volume III: The Physics of Intermediate Spectrum Reactors

Editor: J. R. Stehn, Knolls Atomic Power Laboratory

U. S. Atomic Energy Commission, 1958. 506 pp., 8 by 10. Available from University Microfilms as OP55514 V3. Xerographic copy, paper binding, $60.20. Microfilm, $20.10.
LC 65-60008

An accumulation of physics information obtained from the work on intermediate-spectrum reactors at Knolls Atomic Power Laboratory. The material covers the importance of the properties of critical assemblies and of techniques for obtaining related experimental information; the uses of critical assemblies and reactor theory in making and testing predictions of reactivity variation during operation; the spread of heat resulting from the presence of beryllium or sodium in the reactor, the transient or near-transient behavior of intermediate reactors. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Neutron Cross Sections

(Third edition; in two volumes)

S. F. Mughabghab and D. I. Barber, National Neutron Cross Section Center, Brookhaven National Laboratory

Volume 1: Resonance Parameters

Brookhaven National Laboratory, 1973. 764 pp., 6 by 9. Available from NTIS as BNL-325(3rd Ed.)(Vol. 1). Price schedule on page iii.

Volume 2
In preparation.

A compendium of those portions of neutron data which are considered to be of prime importance and best suited for inclusion in ready reference form. This edition, significantly aided by computer techniques, consists of two volumes. Volume 1, covering thermal cross sections, resonance properties, resonance parameters, and bibliography, and Volume 2, still in preparation, covering curves and bibliography. As in previous editions, recommended values for thermal cross sections and resonance parameters, eye-guide curves, and references to all data are included.

Complete and detailed data on resonance parameters or cross sections, such as those published in previous editions of BNL-325, are available from the National Neutron Cross Section Center (NNCSC), Brookhaven National Laboratory. Answers to the requests are given on the basis of a library of 150,000 resonance parameters and over 1,250,000 cross section points.

CONTENTS:

Volume 1. Examples of requests from NNCSC. Notation and nomenclature. Introduction: considerations involving thermal cross sections; considerations involving resonance properties; considerations involving individual resonance parameters. References. Recommended parameters, properties, and bibliography: $1 \leq Z \leq 20$; $21 \leq Z \leq 39$; $40 \leq Z \leq 59$; $60 \leq Z \leq 89$; $90 \leq Z \leq 100$. Table of strong resonances ordered by energy: eV region; keV region. Reference code mnemonics. Map of 4 center geographic areas.

Neutron Standards and Flux Normalization

(AEC Symposium Series)
Coordinator: Alan B. Smith, Argonne National Laboratory
U. S. Atomic Energy Commission, 1971. 525 pp., 6 by 9. Available from NTIS as CONF-701002. Paper copy, $6.00. Microfiche, $3.00.
LC 77-611328

Proceedings of a symposium held at Argonne National Laboratory, Oct. 21–23, 1970, sponsored by the European–American Nuclear Data Committee. The goals of this symposium were to (1) quantitatively assess the status of the field, (2) define available precisions, (3) identify outstanding problems, (4) formulate recommendations, and (5) provide guidance for future work. This volume will be a valued reference and guide for future work in the field of neutron standards for a considerable period of time.

Nuclear Data Sheets

Editor: Nuclear Data Group, Oak Ridge National Laboratory
Academic Press, monthly journal, three volumes per year (four issues each), $33.00 per volume.

A journal devoted to compilations and evaluations of experimental and theoretical results in nuclear physics. The Nuclear Data Sheets present periodically revised collections of experimental information on nuclear structure. Data "adopted" by the compilers are combined with results from a few accepted theoretical calculations to produce in a uniform way the best nuclear level scheme that can be constructed at the time of compilation.

Nuclear-Explosion Seismology

(AEC Critical Review Series)
Howard C. Rodean, Lawrence Livermore Laboratory
U. S. Atomic Energy Commission, 1971. 164 pp., 7 by 10. Available from NTIS as TID-25572. Paper copy, $3.00. Microfiche, $3.00.
LC 73-170333

A summary of the unclassified information pertinent to the generation of seismic signals by underground nuclear explosions, including decoupling and low-coupling phenomena that minimize these signals. The description of underground nuclear explosions includes the effects of rock-property variations on seismic-signal strength. The principles of elastic-wave theory are summarized for three major types of waves: compressional, shear, and Rayleigh. Theoretical compressional wave solutions are given for both ground motion and seismometer response to this motion. Available seismic-magnitude data are presented as a function of explosion yield and environment. The review concludes with a summary of what is and is not known about seismic-signal generation by underground nuclear explosions.

The Optics of Dipole Magnets

John J. Livingood, Argonne National Laboratory
Academic Press, 1969. 261 pp., 6 by 9, $24.50.
LC 68-23490 ISBN 0-12-453050-8

A clear, systematic introduction to the study of magnets used to deflect moving charged particles. The matrix method was chosen, in first-order approximation, to be the basis for a single approach to the different types of magnets and their uses.

The Padé Approximant in Theoretical Physics

Editors: George A. Baker, Jr., Brookhaven National Laboratory, and John L. Gammel, Los Alamos Scientific Laboratory
Academic Press, 1970. 378 pp., 6 by 9, $28.50.
LC 70-137682 ISBN 0-12-074850-9

A collection of original papers by some of the authors who have been particularly active in an attempt to sweep away once and for all the notion that only a convergent series well inside its radius of convergence or an asymptotic series of rapidly decreasing terms is useful. Volume 71 in the Mathematics in Science and Engineering series.

Particle-Transport Simulation with the Monte Carlo Method

(ERDA Critical Review Series)
L. L. Carter and E. D. Cashwell, Los Alamos Scientific Laboratory
Energy Research and Development Administration, 1975. 124 pp., 7 by 10. Available from NTIS as TID-26607. Paper copy, $5.45. Microfiche, $3.00.
LC 75-25993

A book directed to the engineer, physicist, or mathematician who wants to apply the techniques of Monte Carlo to neutron and photon transport. The fundamental ideas of Monte Carlo are discussed, and many techniques used in modern computer codes are reviewed. The important reactions undergone by neutrons and photons are treated, with a view to helping the reader to understand the problems encountered and also to aid him in solving his own problems. The authors attempt to present the important theoretical ideas as clearly as possible, with emphasis on practical applications to transport problems. An extensive literature survey is included to help the reader delve into certain topics deeper than is possible in the monograph and to aid him in investigating entirely different uses of Monte Carlo.
CONTENTS: Introduction. Sampling methods. Mathematical prescriptions for simulating particle transport. Mechanics of simulating particle transport. Neutron transport. Photon transport. Literature survey. Index.

Photoelectron and Auger Spectroscopy

Thomas A. Carlson, Oak Ridge National Laboratory
Plenum, 1975. 417 pp., 6 by 9, $32.50.
LC 75-28025 ISBN 0-306-33901-3

A book intended primarily for researchers and would-be researchers, both as an introduction to the field of electron spectroscopy and as a reference book for demonstrating its accomplishments and potential. The author gives the theoretical and instrumental bases of the field and provides a survey of the literature. The three most profitable areas of study are presented in detail: X-ray photoelectron spectroscopy, ultraviolet spectroscopy, and Auger electron spectroscopy. The use of electron spectroscopy in determining chemical bonding and the nature of molecular orbitals is explained, and many examples are presented for the application to a wide variety of disciplines including analytical chemistry, biochemistry, environmental science, and surface studies.
CONTENTS: Introduction. Instrumentation and experimental procedures. Fundamental concepts. Photoelectron spectroscopy of the outer shells. Photoelectron spectroscopy of the inner shells. Auger electron spectroscopy. Appendixes: atomic binding energies for each subshell for elements $Z = 1 - 106$; energy separation between j subshells in atoms; compilation of data on shifts in core binding energies; acronyms and definitions of special interest in electron spectroscopy. References. Index.

Principles of Cyclic Particle Accelerators

John J. Livingood, Argonne National Laboratory
D. Van Nostrand Co., 1961. 392 pp., 6 by 9. Available from Krieger, $16.50.

A coherent discussion of existing varieties of cyclic particle accelerators—cyclotrons, synchrocyclotrons, synchrotrons, betatrons, microtrons, linear accelerators, and isochronous and stochastic machines. This book describes these accelerators in sufficient detail to show their principles of operation, similarities, differences, and limitations.

Problems of Physics in the Ion Source

(National Nuclear Energy Series, Division I, Volume 8)

Arthur H. Barnes, Argonne National Laboratory, S. M. MacNeille, Eastman Kodak Company, and Chauncey Starr, North American Aviation, Inc.

U. S. Atomic Energy Commission, 1951. 294 pp., 6 by 9. Available from University Microfilms as OP6229: Xerographic copy, paper binding, $34.50. Microfilm (35 mm), $11.50. Also available from Microforms International: Microfilm (16 mm), $10.00.

A presentation of the fundamental processes involved during operation of the calutron source units at Clinton Engineer Works and a description of the experiments that enabled the investigators to determine them.

Production and Separation of ^{233}U: Collected Papers

(National Nuclear Energy Series, Division IV, Volume 17B)

Editor: Leonard I. Katzin, Argonne National Laboratory

U. S. Atomic Energy Commission, 1952. 743 pp., 6 by 9. Available from NTIS as TID-5223: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $18.75.

The assembled record of significant work relating to ^{233}U which was done on the Manhattan Project.

Production and Separation of ^{233}U: Survey

(National Nuclear Energy Series, Division IV, Volume 17A)

Editors: Glenn T. Seaborg, Radiation Laboratory, University of California, and Leonard I. Katzin, Argonne National Laboratory

U. S. Atomic Energy Commission, 1951. 236 pp., 6 by 9. Available from NTIS as TID-5222: Price schedule on page iii. Also available from Microforms International: Microfilm (16 mm), $10.00.

A survey of the properties of ^{233}U and the methods of its production.

Project Sherwood: The U. S. Program in Controlled Fusion

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)

Amasa Bishop, European Scientific Representative, U. S. Atomic Energy Commission

Addison-Wesley, 1958. 216 pp., 6 by 9. Available from University Microfilms as OP17579. Xerographic copy, paper binding, $25.80. Microfilm, $8.60.

An account of the extensive research and development undertaken by the U. S. Atomic Energy Commission for harnessing the energy of thermonuclear reactions. It presents a factual and readable account of Project Sherwood, including its origin, its development, its problems, and the outlook for its eventual success. The book describes the basic principles involved in a fusion reaction and the various methods being studied to control thermonuclear energy, with the hope of eventually producing net power. Translated into French and Italian.

Slow Neutron Scattering and Thermalization

D. E. Parks, M. S. Nelkin, J. R. Beyster, and N. F. Wikner, Gulf General Atomic, Inc.

W. A. Benjamin, Inc., 1970. 838 pp., 6 by 9. Available from Addison-Wesley, $24.50.

LC 78-136509 ISBN 0-8053-7760-3

A book intended primarily for people interested in reactor-design physics, for specialists in the field of thermalization, and for teachers and students at the graduate levels of nuclear science and engineering. The book provides a systematic exposition of the theory and measurement of thermal-neutron spectra and of the relevance of neutron thermalization for problems of reactor-design physics.

Stress Wave Propagation in Solids: An Introduction

Richard J. Wasley, Lawrence Livermore Laboratory
Marcel Dekker, Inc., 1973. 279 pp., 6 by 9, $23.25.
LC 73-78561 ISBN 0-8247-6039-5

A text emphasizing the physical basis and general meaning of stress wave propagation and providing applications and explanatory examples where appropriate. The first part of the book treats some of the dynamic analyses of elastic solid media which obey Hooke's law, i.e., of solids that exhibit linear behavior with negligible internal friction. The last section treats some of the theoretical and experimental aspects of two interrelated classes of nonelastic mechanical wave phenomena in solids, namely (1) high-strain-rate, elastic–plastic loading under conditions of macroscopic (continuum) one-dimensional stress and (2) shock-wave propagation under conditions of macroscopic one-dimensional strain. One of the main themes of the presentation is the application of dynamic elastic concepts to certain dynamic nonelastic phenomena. The book is intended to assist scientists and engineers who are only partly familiar with the subject and desire further understanding through self-study; it can be used in upper division or early graduate level work. The reader is assumed to have a grasp of the fundamentals of mathematics, mechanics, and physical science, including some experience with the subject of elasticity, and to have had a reasonable exposure to experimental work.

CONTENTS: Introduction. Part I: Concepts of Elasticity. Elasticity: quasistatic and dynamic response. Wave propagation in extended media. Wave propagation in semi-extended media: reflection and refraction. Wave propagation in circular cylindrical rods. Selected applications of concepts of elasticity. Part II: Extension of Applications of Elastic Concepts. Nonelastic material behavior. One-dimensional stress wave investigations. Nonelastic (shock) one-dimensional strain wave investigations. References. Other selected references. Author and subject indexes.

Technology of Controlled Thermonuclear Fusion Experiments and the Engineering Aspects of Fusion Reactors

(AEC Symposium Series)
Coordinator: E. Linn Draper, Jr., University of Texas
U. S. Atomic Energy Commission, 1974. 1052 pp., 6 by 9. Available from NTIS as CONF-721111. Paper copy, $16.60. Microfiche, $3.00.
LC 74-600044

Proceedings of a symposium held at the University of Texas, Austin, Tex., Nov. 20–22, 1972, sponsored by the Texas Atomic Energy Research Foundation, University of Texas at Austin, Controlled Nuclear Fusion Group of the American Nuclear Society, U. S. Atomic Energy Commission, and Power Engineering Society of the Institute of Electrical and Electronics Engineers. Part of a continuing effort to bring controlled fusion to fruition, this volume discusses the technological problems associated with feasibility experiments and the engineering problems of fusion reactor design. The papers presented contribute to the broad base of information that must be developed so that researchers can evaluate the engineering and scientific problems and assess alternative research projects. Although progress will continue to be made in the areas covered by this meeting, much of the material presented will be of long-term interest.

CONTENTS: Papers dealing with feasibility experiments; electrical storage and handling for fusion experiments; diagnostic and control instrumentation; magnet and vacuum systems; engineering design of reactor blankets; plasma fueling, heating, ignition, and recovery systems; materials considerations; energy conversion schemes; and reviews of several international programs (63 papers). Paper discussions. Index.

Theory of Charge Exchange

Robert A. Mapleton, Air Force Cambridge Research Laboratory
John Wiley & Sons, 1972. 294 pp., 7 by 9, $24.50.
LC 75-16839 ISBN 0-471-56781-7

A description and explanation of many of the approximating procedures in the literature. Quantum mechanical and semiclassical approximating methods are discussed. Both the wave and impact-parameter versions are discussed and explained, with particular attention given to the coordinate systems used. Classical methods developed and revived during the last decade are discussed. Asymptotic variations of cross sections obtained by classical and quantum mechanical methods are compared. The last chapter contains 26 figures comparing calculated and experimentally determined cross sections and discussions of what is

calculated and what is compared. One appendix is wholly devoted to the application of fractional parentage coefficients to problems of capture from many-electron atoms. A volume in the Wiley-Interscience Atomic and Molecular Collisional Processes series.
CONTENTS: Introduction. Quantum mechanical methods for low velocities. Electron capture: sundry topics. Quantum mechanical methods for high velocities. Second Born approximation. Classical methods for high velocities. Comparisons of theoretical and experimental cross sections. Appendixes: expansions of the momentum change vectors; fractional parentage coefficients for equivalent *p* electrons; first and second Born approximations: supplementary notes. Author and subject indexes.

Utilization of Heavy Water

(National Nuclear Energy Series, Division III, Volume 4B)
Isidor Kirshenbaum, Standard Oil Development Company
U. S. Atomic Energy Commission, 1951. 208 pp., 6 by 9. Available from University Microfilms as OP6222. Xerographic copy, paper binding, $23.80. Microfilm (35 mm), $8.00. Also available from Microforms International: Microfilm (16 mm), $10.00.
A discussion of the use of heavy water in reactors, the properties and reactions of heavy water and uranium oxide mixtures, and the stability of construction materials.

RECENT PUBLISHED SYMPOSIUMS FROM ERDA PROJECTS

(For volumes available from NTIS, see price schedule on page iii.)

Neutron Scattering, Proceedings of the Conference on
Gatlinburg, Tenn. June 6–10, 1976. Sponsored by Oak Ridge National Laboratory and Energy Research and Development Administration. 1976.
Volume 1. 592 pp. Available from NTIS as CONF-760601-P1.
Volume 2. 612 pp. Available from NTIS as CONF-760601-P2.

New Pathways in High-Energy Physics I and II
Studies in the Natural Sciences, Volumes 10 and 11
Proceedings of Orbis Scientiae 1976
Coral Gables, Fla. Jan. 19–22, 1976. Supported by National Science Foundation Office of International Programs and Energy Research and Development Administration. 1976.
Magnetic Charge and Other Fundamental Approaches. 415 pp. Available from Plenum. $39.50.
New Particles—Theories and Experiments. Available from Plenum. $39.50.

Particle Searches and Discoveries—1976
AIP Conference Proceedings No. 30, Particles and Fields Subseries No. 11
Nashville, Tenn. Mar. 1–3, 1976. Sponsored by National Science Foundation, Energy Research and Development Administration, and Vanderbilt University Research Council. 348 pp. Available from American Institute of Physics as CONF-760344. $18.50.

RF Plasma Heating, Second Topical Conference on
Lubbock, Tex. June 20, 1974. Sponsored by Texas Technological University, American Physical Society, IEEE Nuclear and Plasma Sciences Society, and U. S. Atomic Energy Commission. 1974. 259 pp. Available from NTIS as CONF-740642.

Surface Effects in Controlled Fusion
Proceedings of the Conference on Surface Effects in Controlled Thermonuclear Fusion Devices and Reactors
Argonne, Ill. Jan. 10–12, 1974. Sponsored by Argonne National Laboratory and U. S. Atomic Energy Commission. 1974. 373 pp. Available from Elsevier/North Holland Publishing Co. $76.95.

RECENT AND RELEVANT BIBLIOGRAPHIES

(For volumes available from NTIS, see price schedule on page iii.)

Controlled Fusion and Plasma Research, A Literature Search
USAEC Technical Information Center.
November 1974. 422 pp. Available from NTIS as TID-3557-S3.
November 1974. 342 pp. Available from NTIS as TID-3557-S4.

February 1974. 564 pp. Available from NTIS as TID-3557-S9.
October 1975. 516 pp. Available from NTIS as TID-3557-S10.
Spring 1977. In preparation. Will be available from NTIS as TID-3557-S11.

Electrical and Thermal Transport Properties of Uranium and Plutonium Carbides
Los Alamos Scientific Laboratory. September 1976. 33 pp. Available from NTIS as LA-6096.

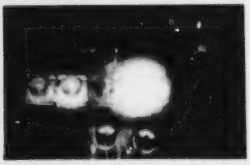
Experimental Data of Neutron-Induced Interactions, Bibliography of the
Lawrence Livermore Laboratory. March 1974. 638 pp. Available from NTIS as UCRL-50400(Vol. 2)(Rev. 1).

Highly Ionized Atoms of Importance to Plasmas, Annotated Bibliography of
Sandia Laboratories. April 1975. 316 pp. Available from NTIS as SAND-75-8219.

Magnetohydrodynamics: Power Generation and Theory
ERDA Technical Information Center. November 1975. 875 pp. Available from NTIS as TID-3356.

Superconductivity: Theory and Applications, A Bibliography
ERDA Technical Information Center. In preparation. Estimated date of publication: summer 1977. Will be available from NTIS as TID-3355.

Thermal Emittances of Materials, Compilation of Experimental Work on
Ames Laboratory.
Part 1: Metals
April 1974. 308 pp. Available from NTIS as IS-3346(Pt. 1).
Part 2: Non-Metals
April 1974. 351 pp. Available from NTIS as IS-3346(Pt. 2).



REACTORS

Alternatives for Managing Wastes from Reactors and Post-Fission Operations in the LWR Fuel Cycle

(In five volumes)

Report Coordinators: John W. Bartlett, John R. Carrell, Max R. Kreiter, and Allison M. Platt. Editor: Judith A. Powell, Battelle Pacific Northwest Laboratories

Energy Research and Development Administration, 1976. All volumes 8 by 11.

Volume 1: Summary, Alternatives for the Back End of the LWR Fuel Cycle, Types and Properties of LWR Fuel Cycle Wastes, Projections of Waste Quantities, Selected Glossary

180 pp. Available from NTIS as ERDA-76-43(Vol. 1), $7.50. Microfiche, $3.00.

Volume 2: Alternatives for Waste Treatment

520 pp. Available from NTIS as ERDA-76-43(Vol. 2), $12.75. Microfiche, $3.00.

Volume 3: Alternatives for Interim Storage and Transportation

235 pp. Available from NTIS as ERDA-76-43(Vol. 3), $9.00. Microfiche, $3.00.

Volume 4: Alternatives for Waste Isolation and Disposal

235 pp. Available from NTIS as ERDA-76-43(Vol. 4), $8.00. Microfiche, $3.00.

Volume 5: Appendices

296 pp. Available from NTIS as ERDA-76-43(Vol. 5), $9.25. Microfiche, $3.00.

A report describing technical alternatives for managing wastes from the back end of the commercial light-water-reactor fuel cycle. It describes waste types, the alternative technologies that can be used to manage the wastes, and the state of availability of those technologies. It does not select preferred waste management technologies or make comparative assessments. It provides a comprehensive digest of technical information expected to serve as a basis for future decisions, assessments, and environmental impact statements. Its contents serve as a base line subject to future supplementation and updating. There are four major waste management functions: treatment, interim storage, transportation, and final storage or disposal.

CONTENTS:

Volume 1. Executive and technical summaries. Fuel cycle options and waste management for these options. LWR fuel cycle description. LWR fuel cycle wastes from reactors, spent fuel storage facilities, fuel reprocessing plants, and decommissioning of fuel cycle facilities. Basic assumptions and quantities for LWR fuel cycle. Glossary.

Volume 2. Fuel reprocessing modifications. High-level liquid waste solidification. Treatment and immobilization of chop-leach fuel bundle residues. Treatment of noncombustible solid wastes. Treatment of combustible wastes. Treatment of non-high-level liquid

wastes. Recovery of transuranics from non-high-level wastes. Immobilization of miscellaneous non-high-level wastes. Volatile radioisotope recovery and off-gas treatment. Immobilization of volatile radioisotopes. Retired facilities (decontamination and decommissioning). Modification and use of selected fuel reprocessing wastes.

Volume 3. Interim storage of spent fuel elements. Interim storage of chop-leach fuel bundle residues. Tank storage of high-level liquid wastes. Interim storage of solid non-high-level wastes. Interim storage of solidified high-level wastes. Transportation alternatives.

Volume 4. Basic concepts for geologic isolation. Geologic storage alternatives. Geologic disposal alternatives. Extraterrestrial disposal. Transmutation.

Volume 5. Selected glossary. Conversion factors. Geologic isolation. The ocean floor. Government regulations pertaining to the management of radioactive materials.

Boiling Crisis and Critical Heat Flux

(AEC Critical Review Series)

L. S. Tong, Nuclear Energy Systems, Westinghouse Electric Corp.

U. S. Atomic Energy Commission, 1972. 89 pp., 7 by 10. Available from NTIS as TID-25887. Paper copy, $3.00. Microfiche, $3.00.
LC 72-600190

A collection of information concerning critical heat flux, with particular reference to problems of reactor design. The author presents an extensive survey, almost in handbook form, of the data showing the effects of the various operating parameters and of geometry on the boiling crisis. These results are made more plausible by some analyses of proposed models of the crisis conditions in the various flow regimes. The missing links in the analyses are identified, and future work is recommended.

CONTENTS: Introduction. Observed parametric effects and empirical correlations. Theoretical analysis. Summary and recommendations. List of symbols. References. Index.

Boiling Water Reactors

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)

Andrew W. Kramer, editor of *Atomics*

Addison-Wesley, 1958. 563 pp., 6 by 9. Available from University Microfilms as OP17582. Xerographic copy, paper binding, $65.70. Microfilm, $21.90.
LC 58-12603

A reference work on the history and technology of boiling-water reactors which was prepared under the auspices of the Argonne National Laboratory with the cooperation of the many scientists and engineers there who conceived and developed this type reactor. It presents a brief history of the boiling-water concept and of the early experiments of the Argonne Laboratory, including the development and operation of the Experimental Boiling Water Reactor. The various BORAX experiments are described in detail. A thorough explanation is given of the physics underlying the design of the reactor, and a lengthy description of the General Electric Company Vallecitos plant is included. Present and future research and development programs for boiling-water reactors are discussed.

Corrosion and Wear Handbook for Water-Cooled Reactors

Editor: D. J. DePaul, Bettis Plant, Westinghouse Electric Corp.

U. S. Atomic Energy Commission, 1957. 293 pp., 8 by 10. Available from University Microfilms as OP34407. Xerographic copy, paper binding, $34.60. Microfilm, $11.60.
LC 57-61946

A handbook of theory and experimental data on corrosion and wear of materials in water-cooled nuclear reactors. Presented in one reference book are corrosion and wear data resulting from the development of the Nautilus submarine reactor and the Shippingport Pressurized Water Reactor projects. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Design Data and Safety Features of Commercial Nuclear Power Plants

(In four volumes)

Fred A. Heddleson, Oak Ridge National Laboratory

Oak Ridge National Laboratory. All volumes 8 by 11. Available from NTIS as ORNL-NSIC-55 (specify volume). Price schedule on page iii.

Volume I (Dockets 50-3 Through 50-295)
1973. 224 pp.
Volume II (Dockets 50-296 Through 50-395)
1972. 282 pp.
Volume III (Dockets 50-397 Through 50-449)
1974. 41 pp.
Volume IV (Dockets 50-452 Through 50-503)
1975. 159 pp.

Design data, safety features, and site characteristics are summarized for many commercial nuclear power plants in the United States. The data summaries are taken from the Preliminary Safety Analysis Reports, the Final Safety Analysis Reports, and, in most cases, from the Environmental Report generated for the U. S. Atomic Energy Commission licensing authorities by applicants wishing to build and operate nuclear power plants. Included in the data for each plant are thermal-hydraulic and nuclear factors, containment features, emergency core cooling systems, site features, circulating water systems, and miscellaneous factors. An aerial perspective is also presented for each plant.

CONTENTS: (Numbers indicate the units)

Volume I. Big Rock Point; Browns Ferry 1, 2, and 3; Connecticut Yankee; Diablo Canyon 1 and 2; Dresden 1, 2, and 3; Fort Calhoun; Robert Emmett Ginna; Humboldt Bay 3; Indian Point 1, 2, and 3; Millstone 1; Monticello; Nine Mile Point 1; Oconee 1, 2, and 3; Oyster Creek; Palisades; Peach Bottom 2 and 3; Pilgrim 1; Point Beach 1 and 2; Prairie Island 1 and 2; Quad-Cities 1 and 2; H. B. Robinson 2; Salem 1 and 2; San Onofre 1; Surry 1 and 2; Three Mile Island 1 and 2; Turkey Point 3 and 4; Vermont Yankee; Yankee; Zion 1 and 2.

Volume II. Aguirre; Arkansas 1 and 2; Duane Arnold; Bailly 1; Beaver Valley; Bell; Browns Ferry 3; Brunswick 1 and 2; Calvert Cliffs 1 and 2; Donald C. Cook 1 and 2; Cooper; Crystal River 3; Davis-Besse; Diablo Canyon 2 and 3; Enrico Fermi 2; Joseph M. Farley 1 and 2; James A. Fitzpatrick; Forked River; Edwin I. Hatch 1 and 2; Hutchinson Island 1 and 2; Indian Point 4 and 5; Kewaunee; La Salle County 1 and 2; Limerick 1 and 2; Maine Yankee; McGuire 1 and 2; Midland 1 and 2; Millstone 2; Newbold Island 1 and 2; North Anna 1 and 2; Point Beach 1 and 2; Prairie Island 1 and 2; Rancho Seco; Salem 1 and 2; San Onofre 2 and 3; Seabrook; Sequoyah 1 and 2; Shoreham; Susquehanna 1 and 2; Three Mile Island 1 and 2; Trojan; Virgil C. Summer; Waterford (two units); Watts Bar 1 and 2; Zimmer 1 and 2; Zion 1 and 2.

Volume III. Beaver Valley 2; Bellefonte 1 and 2; Catawba 1 and 2; Comanche Peak 1 and 2; Douglas Point 1 and 2; Grand Gulf 1 and 2; Hanford 2; La Crosse; Mendocino 1 and 2; Millstone 3; Nine Mile Point 2; North Anna 3 and 4; Perry Nuclear 1 and 2; Seabrook 1 and 2; Shearon Harris 1 to 4; Surry 3 and 4; Vogtle 1 to 4.

Volume IV. Allens Creek 1 and 2; Braidwood 1 and 2; Byron 1 and 2; Callaway-1 and 2; Cherokee 1, 2, and 3; Clinton 1 and 2; Davis-Besse 2 and 3; Greenwood 2 and 3; Koshkonong 1 and 2; Montague 1 and 2; Perkins 1, 2, and 3; Pilgrim 2 and 3; Quanicassee 1 and 2; River Bend 1 and 2; South Texas 1 and 2; Sterling 1; Tyrone 1 and 2; Wolf Creek 1.

Earthquakes and Nuclear Power Plant Design

T. F. Lomenick and staff of the Nuclear Safety Information Center,
Oak Ridge National Laboratory
Oak Ridge National Laboratory, 1970. 216 pp., 9 by 11. Available from NTIS as ORNL-NSIC-28. Price schedule on page iii.

A state-of-the-technology survey of the design of nuclear power plants to withstand earthquakes to the extent needed for safety. The authors studied the bases for siting and designing of nuclear power plants in the United States in consultation with both industry and regulatory personnel. The presentation discusses earthquakes and nuclear plant design principally on the basis of what the earth science and engineering professions were doing about earthquakes before 1968.

The Experimental Boiling Water Reactor (EBWR)

Argonne National Laboratory
U. S. Atomic Energy Commission, 1957. 233 pp., 8 by 10. Available from University Microfilms as OP33512. Xerographic copy, paper binding, $28.30. Microfilm, $9.50.

A detailed technical description of the experimental atomic power plant at Argonne National Laboratory written by the scientists and engineers who designed and built the plant and placed it in operation.

Fast Burst Reactors

(AEC Symposium Series)

Technical coordinators: Robert L. Long, University of New Mexico, and Paul O'Brien, Sandia Corporation

U. S. Atomic Energy Commission, 1969. 646 pp., 6 by 9. Available from NTIS as CONF-690102. Paper copy, $6.00. Microfiche, $3.00.

LC 73-603552

A record of the proceedings of a national topical meeting held in Albuquerque, N. Mex., Jan. 28–30, 1969, sponsored by U. S. Atomic Energy Commission and the American Nuclear Society. For the first time in one document, the field of fast burst reactors is reviewed in detail, and the direction of future research is outlined.

Fast Reactor Technology: Plant Design

Editor: John G. Yevick, U. S. Atomic Energy Commission

Associate Editor: A. Amorosi, Atomic Power Development Associates, Inc.

MIT Press, 1966. 754 pp., 7 by 10, $40.00.

LC 66-22352 ISBN 0-262-24003-3

A design handbook of nuclear power plants with emphasis on sodium-cooled fast reactors. This book contains information on BR-5, Dounreay, and Rapsodie reactors in addition to U. S. fast reactors.

Fluid Fuel Reactors

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva 1958, presentation volume)

Editors: J. A. Lane and H. G. MacPherson, Oak Ridge National Laboratory, and Frank Maslan, Brookhaven National Laboratory

Addison-Wesley, 1958. 979 pp., 6 by 9. Available from University Microfilms as OP17578. Xerographic copy, paper binding, $115.00. Microfilm, $38.40.

LC 58-12600

A comprehensive discussion of three basic types of fluid-fuel reactors. This book summarizes results of research carried on in the United States for almost 10 years. A unique feature of this work is its approach to the subject from the chemical standpoint rather than from the mechanical engineering standpoint.

Fuel Element Experience in Nuclear Power Reactors

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)

Massoud T. Simnad, Gulf General Atomic, Inc.

Gordon and Breach, 1971. 632 pp., 6 by 9. Available from American Nuclear Society, $37.50.

LC 78-131892

A monograph providing summaries of characteristics of nuclear power reactors, descriptions of fuel-element designs and materials, and reviews of operational and developmental experience with the fuel elements. For more detailed information, references are given for each reactor. Each section has a general introduction followed by an alphabetical list of reactors. The reactors are classified primarily according to the type of coolants used, with a separate section for fast breeder reactors.

Fundamental Aspects of Reactor Shielding

Herbert Goldstein, Nuclear Development Corporation of America

Johnson Reprint Corp., 1959. 416 pp., 6 by 9, $20.75.

LC 59-7552 ISBN 0-384-19100-2

An exposition of the fundamental processes involved in shielding against neutron and gamma radiation. This book is a revision of "The Attenuation of Gamma Rays and Neutrons in Reactor Shields," which is now out of print.

Neutron Dynamics and Control

(AEC Symposium Series)

Coordinators: David L. Hetrick and Lynn E. Weaver, University of Arizona

U. S. Atomic Energy Commission, 1966. 612 pp., 6 by 9. Available from NTIS as CONF-650413. Paper copy, $6.00. Microfiche, $3.00.

LC 66-60098

Proceedings of a symposium held at the University of Arizona, Tucson, Apr. 5–7, 1965, sponsored by the University of Arizona and the U. S. Atomic Energy Commission. This symposium is a sequel to the 1963 Symposium on Nuclear Engineering, Reactor Kinetics and Control, which was published in the AEC Symposium Series as TID-7662.

Neutron Noise, Waves, and Pulse Propagation

(AEC Symposium Series)

Coordinator: Robert E. Uhrig, University of Florida

U. S. Atomic Energy Commission, 1967. 788 pp., 6 by 9. Available from NTIS as CONF-660206. Paper copy, $6.00. Microfiche, $3.00.
LC 67-60048

Proceedings of a symposium held at the University of Florida, Gainesville, Feb. 14–16, 1966, sponsored by the University of Florida and the U. S. Atomic Energy Commission. An outgrowth of the 1963 symposium Noise Analysis in Nuclear Systems, this symposium brought together the leading authorities, 18 from foreign countries, who work in the fields of neutron noise analysis and neutron-wave and pulse propagation to define the state of the art. Experimental and theoretical topics are about equally represented. The relation between neutron-wave and neutron-pulse propagation is clearly pointed out, and the advantages of each technique are represented. Significant were the emergence of the two-detector cross-correlation technique, which can discriminate against detector noise, and of the use of pseudorandom inputs as a technique for measuring reactor parameters. The increasingly important role of spatially dependent reactor kinetics is demonstrated.

Noise Analysis in Nuclear Systems

(AEC Symposium Series)

Coordinator: Robert E. Uhrig, University of Florida

U. S. Atomic Energy Commission, 1964. 513 pp., 6 by 9. Available from NTIS as TID-7679. Paper copy, $6.00. Microfiche, $3.00.

Proceedings of a symposium held at the University of Florida, Gainesville, Nov. 4–6, 1963, sponsored by the University of Florida and the U. S. Atomic Energy Commission. The symposium brought together leading authorities, 13 from foreign countries, working in the field of noise analysis to define the state of the art. Theoretical and experimental topics are about equally represented.

Nuclear Power Plant Design Analysis

Alexander Sesonske, Purdue University

U. S. Atomic Energy Commission, 1973. 488 pp., 6 by 9. Available from NTIS as TID-26241. Paper copy, $10.60. Microfiche, $3.00.
LC 73-600245

Background material on topics that play a vital role in the design of commercial nuclear power plants. Since the book provides a level of presentation appropriate for seniors in nuclear engineering undergraduate programs as well as graduate students who have had an introductory course, it could be widely used as a text in design-oriented courses for such students. The coverage is broad enough to give the reader the perspective necessary for a designer. For background, the interplays between engineering disciplines are emphasized. Many topics are considered which no other book currently covers, topics previously described at length only in report literature. An extensive bibliography is provided to aid in additional study in areas of special concern.

CONTENTS: Introduction. Electric utility economics. Nuclear-plant economics. Thermal-transport systems and core design. Nuclear-analysis methods. Safety and related design requirements. Fuel-system analysis. Design considerations. Some optimization approaches. Index.

Nuclear Reactor Control Engineering

J. M. Harrer, Argonne National Laboratory

D. Van Nostrand Co., 1963. 587 pp., 6 by 9. Available from University Microfilms as OP64219. Xerographic copy, paper binding, $68.80. Microfilm, $23.00.

A compilation and analysis of existing information on the theory and design of nuclear-reactor control systems. The comprehensive presentation gives the reader much more than a fundamental knowledge of this field.

Nuclear Reactor Engineering

(Second edition)

Samuel Glasstone, consultant to the U. S. Atomic Energy Commission,
and Alexander Sesonske, Purdue University

D. Van Nostrand Co., 1967. 830 pp., 6 by 9, $14.50.

LC 55-8832 ISBN 0-442-02725-7

An updated and reorganized version of Samuel Glasstone's "Principles of Nuclear Reactor Engineering" and a basic and widely used introductory text to nuclear engineering.

Nuclear Reactor Experiments

Editor: J. B. Hoag, Argonne National Laboratory

D. Van Nostrand Co., 1958. 480 pp., 6 by 9. Available from University Microfilms as OP64220. Xerographic copy, paper binding, $56.60. Microfilm, $18.90.

LC 58-7962

A laboratory manual detailing 49 experiments involving the theory and practice of fission-reactor measurements.

Nuclear Reactor Instrumentation (In-Core)

(American Nuclear Society—U. S. Atomic Energy Commission Monograph)

James F. Boland, Argonne National Laboratory

Gordon and Breach, 1970. 229 pp., 6 by 9. Available from American Nuclear Society, $12.50.

LC 76-101310

A book directed primarily to the scientist, engineer, student, or technician who wishes to acquire an understanding of the methods for making in-core measurements, the limitations of available instruments, or the problems associated with development of better in-core instruments. Sufficient fundamentals, basic equations, and design descriptions are included for anyone with some scientific background to understand the operating principles of each type of instrument and to appreciate the effects that radiation might have on its performance.

Nuclear Reactor Theory

George I. Bell, Los Alamos Scientific Laboratory, and Samuel Glasstone, consultant to the U. S. Atomic Energy Commission

Van Nostrand Reinhold, 1970. 620 pp., 6 by 9, $29.95.

LC 73-122674 ISBN 0-442-20684-4

A book on nuclear reactor theory written on a technical level suitable for nuclear reactor design engineers and graduate students of nuclear science and engineering.

Nuclear Reactors Built, Being Built, or Planned in the United States

(Semiannual publication)

Technical Information Center, Energy Research and Development Administration

Energy Research and Development Administration. Revisions dated June 30 and December 31 of each year. 45 pp. (approx.), 8 by 11. Available from NTIS as TID-8200. Paper copy only, $3.25.

A compilation containing current unclassified information about U. S. facilities for domestic use or export which are capable of sustaining a nuclear chain reaction. Information given includes location, owner, principal nuclear contractor, type of reactor, power rating, startup date, and, where applicable, shutdown date.

CONTENTS: Statistical summary. Civilian reactors. Production reactors. Military reactors. Reactors for export. Critical-assembly facilities. Reactor index.

Physics of Nuclear Kinetics

George Robert Keepin, Los Alamos Scientific Laboratory,
on leave to the International Atomic Energy Agency

Addison-Wesley, 1965. 433 pp., 6 by 9, $15.00.

LC 64-20831 ISBN 0-201-03682-7

A comprehensive evaluation of nuclear kinetics in two main parts. Chapters 1 to 5 describe the intensive properties of neutrons, with particular attention to the physics of neutron-induced fission. Chapters 6 to 10 are concerned with the extensive or microscopic

behavior of neutron populations in bulk media and the resulting implications for the dynamic behavior of nuclear chain reactors.

Protection of Nuclear Power Plants Against External Disasters

Editor: William B. Cottrell, Oak Ridge National Laboratory
Oak Ridge National Laboratory, 1975. 401 pp., 8 by 11. Available from NTIS as ORNL-NSIC-117. Price schedule on page iii.

A bibliography and compilation of articles on the protection of nuclear power plants from external disasters. Disasters discussed include tornadoes and high winds, floods and high waves, earthquakes, plane crashes, sabotage and diversion, acts of war, and other incidents such as fire and hazardous chemical release. Although most articles are review articles selected from the journal "Nuclear Safety," relevant regulations, rulings, and regulatory guides are also included. The bibliography with each section includes all recent literature on each topic, each with its own keyword, author, and permuted-title indexes.

CONTENTS: Introduction. Tornadoes and high winds (4 articles). Floods (and high waves) (5 articles). Earthquakes (11 articles). Plane crashes (2 articles). Sabotage and diversion (6 articles). War (4 articles). Other disasters (3 articles). Master index.

Random Noise Techniques in Nuclear Reactor Systems

Robert E. Uhrig, University of Florida
Ronald Press, 1970. 483 pp., 6 by 9, $22.50.
LC 71-110558

A reference book for engineers and scientists interested in applying random noise techniques to physical and engineering systems, particularly to nuclear reactor systems. This book provides a general background on random noise theory. Although three chapters deal specifically with nuclear processes, most of the material in the other chapters is concerned with basic relations of random noise theory and the techniques and instrumentation for acquisition, transmission, recording, and processing of data from random noise experiments. The book has application to a broad range of physical and engineering systems and should be useful as well in such fields as random vibration, oceanography, medicine, communications, and information sciences.

Reactivity Coefficients in Large Fast Power Reactors

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)
Harry H. Hummel and David Okrent, Argonne National Laboratory
American Nuclear Society, 1970. 386 pp., 6 by 9, $18.40.
LC 73-119000

A comprehensive and self-contained discussion of data and methods for calculating reactivity coefficients and of the significance of reactivity coefficients for the operation and safety of fast reactors.

Reactor Dynamics and Control

Lynn E. Weaver, University of Arizona
American Elsevier Publishing Co., 1968. 307 pp., 6 by 9, $15.00.
LC 67-28998 ISBN 0-444-00032-1

An introduction to the state-variable approach and the application of various techniques to reactor dynamics and control. The book begins with a review of the mathematical concepts on which the state-variable approach is based and leads to problem formulation in terms of phase, canonic, and system variables. Various reactor models are discussed and analyzed in regard to stability with the use of state-space methods presented in the text. Optimal control, centered about Pontryagin's maximum principle and the Hamilton–Jacobi method, is considered with application to optimal reactor control for various performance indices. An approach to reactor control termed state-variable-feedback design is introduced with specific examples of control-system design for various reactor models.

Reactor Handbook

(Second edition; in four volumes)
Interscience Publishers. All volumes 8 by 10.
LC 60-11027

Volume I: Materials
Editor: C. R. Tipton, Jr., Battelle Memorial Institute
1960. 1207 pp., $48.25.
ISBN 0-470-71082-9

Volume II: Fuel Reprocessing
Editors: S. M. Stoller, formerly of Vitro Corporation of America,
and R. B. Richards, General Electric Company
1961. 665 pp., $31.00.
ISBN 0-470-71115-9
Volume III, Part A: Physics
Editor: H. Soodak, Nuclear Development Corporation of America
1962. 313 pp., $17.00.
ISBN 0-470-71148-5
Volume III, Part B: Shielding
Editors: E. P. Blizard and Lorraine S. Abbott, Oak Ridge National Laboratory
1962. 287 pp., $14.25.
ISBN 0-470-71150-7
Volume IV: Engineering
Editors: Stuart McLain, consultant to Argonne National Laboratory,
and John H. Martens, Argonne National Laboratory
1964. 857 pp. Available from University Microfilms as P8663 V4ED2.
Xerographic copy, paper binding, $100.00. Microfilm, $33.40.
A handbook that provides authoritative accounts of nuclear theory, data, hardware, and processes developed in atomic energy programs. The "Reactor Handbook" represents the efforts of several hundred authors and contributors and is a desk reference for technical people engaged in research, development, and design. More than five years of effort went into the preparation of this edition, the process of gathering, evaluating, digesting, and organizing the vast quantity of information being under the guidance of eminent men in the field.

Reactor Kinetics and Control

(AEC Symposium Series)
Coordinator: Lynn E. Weaver, University of Arizona
U. S. Atomic Energy Commission, 1964. 593 pp., 6 by 9. Available from NTIS
as TID-7662. Paper copy, $6.00. Microfiche, $3.00.
Proceedings of a symposium held at the University of Arizona, Tucson, Mar. 25–27, 1963, sponsored by the University of Arizona in cooperation with Argonne National Laboratory and Associated Midwest Universities.

Reactor Noise

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)
Joseph A. Thie, consultant to the U. S. Atomic Energy Commission
Rowman and Littlefield, 1963. 262 pp., 6 by 9. Available from American
Nuclear Society, $5.35.
LC 63-20373
A discussion of the use of reactor noise as a means of obtaining information on reactors.

Reactor-Noise Analysis in the Time Domain

(AEC Critical Review Series)
Nicola Pacilio, Argonne National Laboratory and Comitato Nazionale
per l'Energia Nucleare, Italy
U. S. Atomic Energy Commission, 1969. 102 pp., 7 by 10. Available from NTIS
as TID-24512. Paper copy, $6.00. Microfiche, $3.00.
LC 79-600321
A description of 15 methods of reactor-noise analysis, their uses, limitations, and potentialities, and an examination of the possibilities of using current chambers to extend time-analysis methods to non-zero-power systems.

Reactor Physics Constants

(Second edition)
Argonne National Laboratory
U. S. Atomic Energy Commission, 1963. 876 pp., 10 by 12. Available from NTIS
as ANL-5800(2nd edition). Price schedule on page iii.
A compilation of the values of the constants, recipes, formulas, etc., necessary to calculate reactor characteristics.

Reactor Protection System: Philosophies and Instrumentation, Reviews from "Nuclear Safety"

Editor: E. W. Hagen, Oak Ridge National Laboratory

Oak Ridge National Laboratory, 1973. 270 pp., 8 by 11. Available from NTIS as ORNL-NSIC-111. Price schedule on page iii.

Selected articles from the journal "Nuclear Safety" and applicable industry standards summarizing prominent aspects of the design philosophies for the reactor protection system. This review develops a rationale of the doctrines and philosophies governing the design of the reactor trip systems. It is a composite of the ideas previously expressed by many authors and of those promulgated by the industry standards. These separate views and proposed tenets are set into a single composition in an effort to collate the significant concepts.

CONTENTS: Reactor protection system: philosophies and instrumentation. Design principles (11 articles). Reliability (9 articles). Failure tenets (6 articles). Appendix A: Code of Federal Regulations, Title 10, Part 50, Licensing of Production and Utilization Facilities, Appendix A, General Design Criteria for Nuclear Power Plants. Appendix B: IEEE Standard 279-1971: Criteria for Protection Systems for Nuclear Power Generating Stations. Appendix C: American National Standard ANS-4.1: Criteria for Preparation of Design Bases for Systems That Perform Protective Functions in Nuclear Power Stations. Appendix D: IEEE Standard 338-1971: IEEE Trial-Use Criteria for the Periodic Testing of Nuclear Power Generating Station Protection Systems. Appendix E: IEEE Standard 352-1972—IEEE Trial-Use Guide: General Principles for Reliability Analysis of Nuclear Power Generating Station Protection Systems. Appendix F: IEEE Standard 380-1972: Definitions of Terms Used in IEEE Nuclear Power Generating Station Standards. Appendix G: RDT Standard RDT C 16-T: Supplementary Criteria and Requirements for RDT Reactor Plant Protection Systems. Appendix H: USAEC Safety Guides for Water-Cooled Nuclear Power Plants. Appendix I: Protection Instrumentation Systems in Light-Water-Cooled Power Reactor Plants (Abstract: ORNL-NSIC-29) and Design Principles of Reactor Protection Instrument Systems (Abstract: ORNL-NSIC-51). Index.

Reactor Shielding Design Manual

Editor: Theodore Rockwell III, U. S. Atomic Energy Commission

U. S. Atomic Energy Commission, 1956. 478 pp., 8 by 11. Available from NTIS as TID-7004. Price schedule on page iii.

A description of procedures and data used in designing, constructing, and testing the shielding for naval and Shippingport pressurized-water reactors. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Reactor Shielding for Nuclear Engineers

N. M. Schaeffer, Radiation Research Associates, Inc.

U. S. Atomic Energy Commission, 1973. 801 pp., 7 by 10. Available from NTIS as TID-25951. Paper copy, $13.60. Microfiche, $3.00.
LC 73-600001

A text intended for a two-semester course in reactor shielding directed toward an advanced undergraduate or graduate level. The material covers fundamental transport considerations and special topics, such as Monte Carlo techniques, albedos, ducts, shield-analysis projects, seminars on experimental shielding, and shield design. Technical reports have been referenced only when no journal articles could be given. Although titled "Reactor Shielding for Nuclear Engineers," this text should be applicable in related areas where neutron and gamma-ray attenuation are important, as in nuclear weapons shielding and in isotope source applications.

CONTENTS: Historical background. Sources of radiation. Interactions of radiation with matter. Radiation transport. Monte Carlo methods for radiation transport. Shield attenuation calculations. Albedos, ducts, and voids. Shield heating, air transport, shield materials, and shield optimization. Experimental shielding. Shield design. Sixteen appendixes. Exercises and solutions. Author and subject indexes.

Reactor Technology, Selected Reviews—1964

Editor: Leonard E. Link, Argonne National Laboratory

U. S. Atomic Energy Commission, 1964. 636 pp., 6 by 9. Available from NTIS as TID-8540. Price schedule on page iii.

Highlights of a year's progress in reactor technology. This book broadly reviews aspects of the field. The audience includes all active participants in the reactor program from scientists working in the more basic aspects of the applied field to project managers whose duties generally become more administrative than technical.

Reactor Technology, Selected Reviews—1965

Editor: Leonard E. Link, Argonne National Laboratory
U. S. Atomic Energy Commission, 1966. 445 pp., 6 by 9. Available from NTIS as TID-8541. Price schedule on page iii.
LC 66-60019

A sequel to the 1964 edition with the same title. The subject matter is a review of the reactor technology that reached a significant developmental stage during the previous year. The subjects were chosen by an Advisory Committee selected by the U. S. Atomic Energy Commission. Each article was reviewed by at least three technically competent people. The intended audience is broad and includes all those interested in the field, from scientists and engineers to administrators. References provide sources and more-detailed information.

Research Reactors

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1955, presentation volume)
Compilers: North American Aviation, Inc., Oak Ridge National Laboratory, National Reactor Testing Station, Knolls Atomic Power Laboratory, Argonne National Laboratory, and Brookhaven National Laboratory
U. S. Atomic Energy Commission, 1955. 443 pp., 8 by 11. Available from University Microfilms as OP64367. Xerographic copy, paper binding, $52.10. Microfilm, $17.40.

A presentation of detailed descriptions of representative designs of nuclear research reactors.

The Shippingport Pressurized Water Reactor

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)
Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission; Bettis Plant, Westinghouse Electric Corp.; and Duquesne Light Company
Addison-Wesley, 1958. 588 pp., 6 by 9. Available from University Microfilms as OP17585. Xerographic copy, paper binding, $68.60. Microfilm, $22.90.
LC 58-12595

An account of the research and development for and construction of the first large-scale central-station nuclear power plant to be built and operated in the United States. This publication is the basic source book for the plant and its technology. For those who want more-detailed information, selected references are given at the end of each chapter. Sponsored by Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Siting of Nuclear Facilities: Selections from "Nuclear Safety"

Editor: J. R. Buchanan, Oak Ridge National Laboratory
Oak Ridge National Laboratory, 1976. 308 pp., 9 by 11. Available from NTIS as ORNL/NUREG/NSIC-118. Price schedule on page iii.

A report that explores siting policy and practice for nuclear power plants as developed in the United States and abroad. Twenty-two articles from "Nuclear Safety" are reprinted on this general topic as reference material. The appendixes also include reprints of some relevant regulatory rules and guides on siting. Advantages and disadvantages of novel siting concepts such as underground containment, offshore siting, and nuclear energy parks are addressed.

CONTENTS. Introduction. Site criteria. Risk criteria. Nuclear ship criteria. Novel siting concepts. Foreign practice. Meetings on siting. Appendixes: reactor site criteria; calculation of distance factors for power and test reactor sites; general site suitability criteria for nuclear power stations; general administrative activities. Index.

Small-Sample Reactivity Measurements in Nuclear Reactors

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)
Wesley K. Foell, University of Wisconsin
American Nuclear Society, 1972. 261 pp., 6 by 9, $23.50.
LC 74-144051 ISBN 0-677-02280-8

A study on measurement of the effects of a physically small sample of material on the reactivity of a nuclear reactor. The monograph provides useful information for the body of engineers, scientists, and students who wish to use reactivity measurements as a tool for (1)

deriving information about the mechanism of interaction of neutrons with various materials introduced into a nuclear reactor, (2) determining certain properties, e.g., cross sections of the materials, and (3) determining characteristics of the reactor. In addition to systematically treating the conduct and analysis of reactivity measurements in thermal reactors, this work discusses many of the techniques used in fast reactor research and development. This most complete and in-depth treatment of small-sample reactivity measurements in both thermal and fast reactor systems is based on fundamentals and includes many practical applications for examples, making the book useful to experts as well as to those having little familiarity with this field.

CONTENTS: Techniques for precise reactivity measurements. Fundamental problems of design and interpretation of reactivity measurement experiments. Reactivity measurements in thermal systems. Reactivity measurements in fast reactors. Index.

Sodium Graphite Reactors

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)

Chauncey Starr and Robert W. Dickinson, Atomics International, Division of North American Aviation, Inc.

Addison-Wesley, 1958. 288 pp., 6 by 9. Available from University Microfilms as OP17583. Xerographic copy, paper binding, $34.40. Microfilm, $11.50.
LC 58-12598

A unified, coherent presentation of sodium–graphite reactor technology. Emphasis is on design and development of the Sodium Reactor Experiment, but information applicable to sodium–graphite systems and in many cases to reactor design in general is included. The Hallam Nuclear Power Facility, a full-scale sodium–graphite plant, is described.

Solid Fuel Reactors

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)

Joseph R. Dietrich and Walter H. Zinn, General Nuclear Engineering Corp.

Addison-Wesley, 1958. 844 pp., 6 by 9. Available from University Microfilms as OP17587. Xerographic copy, paper binding, $98.10. Microfilm, $32.70.
LC 58-12601

A review of the basic concepts, status of development in the United States, and technical and economic outlooks in the United States for five projected solid-fuel nuclear power reactor types. The information presented is of three main types: (1) general research and development results, such as data of reactor physics experiments, fuel-element developments, and advances in various coolant technologies; (2) design data for specific reactors, which represent the integration of research and development results with design studies; and (3) analytical studies whose purpose has been to direct developmental efforts and to define areas for various reactor types.

System Analysis of Nuclear Reactor Dynamics

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)

Lynn E. Weaver, University of Arizona

Rowman and Littlefield, 1963. 285 pp., 6 by 9. Available from University Microfilms as OP64221. Xerographic copy, paper binding, $34.20. Microfilm, $11.40.
LC 63-20374

A discussion of the various concepts in linear system analysis and their use in analyzing the stability and dynamic behavior of fundamental reactor systems.

Techniques in Fast Reactor Critical Experiments

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)

W. G. Davey and W. C. Redman, Argonne National Laboratory

Gordon and Breach, 1970. 332 pp., 6 by 9. Available from American Nuclear Society, $20.40.
LC 79-110375

A survey of the status of the measurement techniques usually employed in fast critical assembly programs and some opinions regarding future trends.

The Technology of Nuclear Reactor Safety

(In two volumes)

Editors: T. J. Thompson and J. G. Beckerley, Massachusetts Institute of Technology

MIT Press. Both volumes 7 by 10.

LC 64-24957

Volume I: Reactor Physics and Control

1964. 743 pp., $50.00.

ISBN 0-262-20001-5

Volume II: Reactor Materials and Engineering

1973. 820 pp., $50.00.

ISBN 0-262-20005-8

The product of Project SIFTOR (Safety Information for the Technology of Reactors), a coordinated effort sponsored by the U. S. Atomic Energy Commission to evaluate critically, organize, and generalize the growing body of information concerned with safety problems in reactor design and operation. Many leading authorities have contributed to this project, with studies ranging from normal day-to-day operation to catastrophic accidents. The history of specific accidents is reviewed, as is that of tests. The results of numerous theoretical and experimental studies of reactor excursions are synthesized by mathematical models. The problems of containing or confining the energy and radioactive debris that would be released by a serious accident at a reactor installation are considered in detail, as are the safety problems associated with nonnuclear phases of reactor design: mechanical components, chemical reactions, fluid flow, and heat transfer.

Volume I presupposes a knowledge of nuclear reactor theory, and Volume II requires some knowledge of engineering.

CONTENTS:

Volume I. The reactor core. General reactor dynamics. The Doppler coefficient. Criticality. Sensing and control instrumentation. Mathematical models of fast transients. Water reactor kinetics. Kinetics of solid-moderator reactors. Fast-reactor kinetics. Accidents and destructive tests. Appendixes: tabulations of parameters relevant to safety for a number of power reactors; abbreviations used in text. Index.

Volume II. Materials and metallurgy. Fuel elements. Mechanical design of components for reactor systems. Fluid flow. Heat transfer. Chemical reactions. Fission-product release. Fission-product behavior and retention in containment systems. Radioactive-waste management. Concepts of reactor containment. Appendixes: tabulation of parameters relevant to safety for five typical large power reactors; abbreviations used in text; contents of Volume I. Index.

Technology of Steel Pressure Vessels for Water-Cooled Nuclear Reactors: A Review of Current Practice in Design, Analysis, Materials, Fabrication, Inspection, and Test

Editors: G. D. Whitman, G. C. Robinson, Jr., and A. W. Savolainen,
Oak Ridge National Laboratory

Oak Ridge National Laboratory, 1967. 675 pp., 9 by 11. Available from NTIS as ORNL-NSIC-21. Price schedule on page iii.

A comprehensive treatment of current practices in the design and fabrication of steel pressure vessels for light-water-cooled nuclear reactors in present and immediate-future commercial use. This volume identifies environmental and service conditions and examines their effects on materials behavior. In addition to materials properties, metallurgy, and fabrication, this presentation discusses the basic aspects of fracture mechanics and crack growth with emphasis on the low-alloy steels of current interest. Consideration is given to the codes and standards applied in the technology and to areas where augmentation and/or revision appears warranted. The techniques for postoperational and in-service inspection are summarized and evaluated.

Thermal Analysis of Pressurized Water Reactors

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)

L. S. Tong, Westinghouse Electric Corp., and Joel Weisman, University of Cincinnati

American Nuclear Society, 1970. 314 pp., 6 by 9, $24.00.

LC 77-119001

A monograph intended to provide an overall view of the entire field for nuclear engineering graduate students and to provide a general reference for engineers working in the nuclear power industry. The authors present the basic principles underlying thermal and hydraulic

design of pressurized-water reactors. In addition, although the book is not intended to serve as a design manual, empirical data and engineering properties required for design but not available in conventional handbooks are given or cited.

U. S. Reactor Containment Technology: A Compilation of Current Practice in Analysis, Design, Construction, Test, and Operation

(In two volumes)

Editors: William B. Cottrell and A. W. Savolainen, Oak Ridge National Laboratory

Oak Ridge National Laboratory, 1965. 1447 pp., 9 by 11. Available from NTIS as ORNL-NSIC-5, Vols. I and II. Price schedule on page iii.

An authoritative compilation concerned not only with the design of many containment systems but also with how and why these designs were developed and why particular containment systems appear more suitable in certain systems for certain applications. In addition to pertinent details of the design, construction, and test of containment systems, these volumes describe some of the calculational techniques used to determine fluid dynamics and radiological loads on containment systems and discuss experimental data, cost data, and research and development in the field.

U. S. Research Reactor Operation and Use

(United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958, presentation volume)

Editor: Joel W. Chastain, Jr., Battelle Memorial Institute

Addison-Wesley, 1958. 366 pp., 6 by 9. Available from University Microfilms as OP17580. Xerographic copy, paper binding, $43.40. Microfilm, $14.50. LC 58-12596

A presentation of information not only about technical aspects, characteristics, and operating problems but also on administrative, legal, and cost problems. Written primarily for scientists, engineers, and administrators owning or using a reactor, this volume also may serve as a text or reference for introductory courses in reactor engineering.

U. S. Research Reactors

Editor: Joel W. Chastain, Jr., Battelle Memorial Institute

U. S. Atomic Energy Commission, 1957. 78 pp., 9 by 11. Available from NTIS as TID-7013. Price schedule on page iii.

A profusely illustrated booklet that gives the chief features and characteristics of more than 30 research reactors in the United States.

Water Coolant Technology of Power Reactors

(American Nuclear Society–U. S. Atomic Energy Commission Monograph)

Paul Cohen, Westinghouse Electric Corp.

Gordon and Breach, 1969. 439 pp., 6 by 9. Available from American Nuclear Society, $24.50. LC 79-85210

A book directed toward the needs of operators of water-cooled nuclear power plants. This monograph presents the elements of the supporting scientific and engineering disciplines and an interpretative summary of the specialized literature of the field. The multiple influences applicable to most of the processes of interest and the importance of these influences are emphasized. Translated into Russian.

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Gatlinburg, Tenn. May 7, 1974. Sponsored by American Nuclear Society. 1974. 565 pp. Available from NTIS as CONF-740501.

Atomic Industrial Fuel Cycle Conference '75, Remarks Presented by ERDA and UCC Representatives at
Atlanta, Ga. Mar. 18, 1975. Sponsored by Atomic Industrial Forum, Inc. 1975. 80 pp. Available from NTIS as CONF-750317.

Operating Experience and Design Criteria of Sodium Valves, Specialists Meeting on
Richland, Wash. Sept. 23, 1974. Sponsored by Hanford Engineering Development Laboratory. 1974. 605 pp. Available from NTIS as CONF-740964.

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Energy Research and Development Administration, Washington, D. C. June 1975. 189 pp. Available from NTIS as ERDA-31.

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Battelle, Pacific Northwest Laboratories. May 1975. 155 pp. Available from NTIS as BNWL-1917.

Emergency Core Cooling Systems (ECCS) for Light-Water-Cooled Power Reactors (LWRs), Selected Bibliography on
Oak Ridge National Laboratory. April 1974. 188 pp. Available from NTIS as ORNL-NSIC-113.

Gas Cooled Technology, A Bibliography
USAEC Technical Information Center.
Part 1. April 1974. 191 pp. Available from NTIS as TID-3339-P1-1.
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Part 3 Index. January 1974. 330 pp. Available from NTIS as TID-3339-P3-2.
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Hydrogen Considerations in Light-Water Power Reactors, Annotated Bibliography of
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A Bibliography, 1972–1973
USAEC Technical Information Center. January 1974. 337 pp. Available from NTIS as TID-3333-S1.
A Bibliography, July 1973–December 1974
ERDA Technical Information Center. June 1975. 268 pp. Available from NTIS as TID-3333-S2.
A Bibliography, January 1975–June 1976
ERDA Technical Information Center. October 1976. 403 pp. Available from NTIS as TID-3333-S3.

LMFBR Safety, Review of Current Issues and Bibliography of Literature
Oak Ridge National Laboratory.
Volume 1. 1960–1969
October 1976. 516 pp. Available from NTIS as ORNL/NUREG/NSIC-125.
Volume 2. 1970–1972
January 1977. 538 pp. Available from NTIS as ORNL/NUREG/NSIC-129.

Pressure Vessels for Light-Water-Cooled Power Reactors (LWRs), Selected Bibliography on
Oak Ridge National Laboratory. January 1975. 251 pp. Available from NTIS as ORNL-NSIC-119.

Protection of Nuclear Power Plants Against External Disasters
Oak Ridge National Laboratory. April 1975. 401 pp. Available from NTIS as ORNL-NSIC-117.

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ERDA Technical Information Center. May 1975. 100 pp. Available from NTIS as TID-3525-R5-S9. (Bibliographies on this subject for previous years are also available.)

Safety-Related Occurrences in Nuclear Power Plants
Oak Ridge National Laboratory.
Boiling Water, as Reported in 1975, Annotated Bibliography
July 1976. 398 pp. Available from NTIS as ORNL/NUREG/NSIC-126.
As Reported in 1973, Annotated Bibliography
November 1974. 390 pp. Available from NTIS as ORNL-NSIC-114.
As Reported in 1974, Annotated Bibliography
May 1975. 643 pp. Available from NTIS as ORNL-NSIC-122.
Pressurized Water, as Reported in 1975, Annotated Bibliography
July 1976. 378 pp. Available from NTIS as ORNL/NUREG/NSIC-127.

VACUUM TECHNOLOGY

Practical Vacuum Techniques

W. F. Brunner, Jr., and Thomas Batzer, Lawrence Radiation Laboratory
Reinhold Publishing Corp., 1965. 198 pp., 6 by 9. Available from Krieger, $11.50.
LC 65-25375

A basic manual on the construction, operation, and maintenance of modern high-vacuum systems. This book was written to train and instruct vacuum technicians, both on the job and in the technological college. Craftsmen in this field also will find this book usefully instructive. The technical level, including the first chapter on theoretical background material, is directed toward the intelligent, technically orientated, high-school graduate. No college background is assumed.

Vacuum Equipment and Techniques

(National Nuclear Energy Series, Division I, Volume 1)
Editors: A. Guthrie and R. K. Wakerling, Radiation Laboratory,
University of California
McGraw-Hill, 1949. 264 pp., 7 by 10. Available from University Microfilms as
OP45579: Xerographic copy, paper binding, $32.20. Microfilm (35 mm), $10.80.
Also available from Microforms International: Microfilm (16 mm), $10.00.

A review of the studies and developments of high-vacuum equipment and techniques made by the personnel of the University of California Radiation Laboratory under contract with the Manhattan District. This volume is primarily a compilation of observations made in the course of developing high-vacuum equipment suitable for electromagnetic separation plants. Relatively little attention is devoted to operational difficulties experienced with large-scale vacuum installations.

Vacuum Problems and Techniques

(National Nuclear Energy Series, Division I, Volume 11)
C. E. Normand, Frank A. Knox, G. W. Monk, Alan J. Samuel, and W. R. Perret,
Clinton Engineer Works, Tennessee Eastman Corporation
U. S. Atomic Energy Commission, 1950. 289 pp., 6 by 9. Available from NTIS
as TID-5210: Price schedule on page iii. Also available from Microforms
International: Microfilm (16 mm), $10.00.

A discussion of routine production of high vacuum in large systems on a scale never previously undertaken. Such high vacuum was required in the operation of the electro-

magnetic-separation processes for uranium isotopes at the Clinton Engineer Works. This book describes the original vacuum equipment, evaluates its performance in view of the extensive experience gained, and presents the most significant improvements in efficiency that resulted from changes in operating techniques.

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